*March, 1949*

# EDISON ELECTRIC INSTITUTE BULLETIN

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PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

# ELECTRICAL RESEARCH STATISTICS
# THE ELECTRIC LIGHT AND POWER INDUSTRY

## *Current Statistical Data Covering 100 Per Cent of Industry*

*December, 1947-1948*

### SOURCE AND DISPOSAL OF ENERGY—MONTH OF DECEMBER

| | 1948 | 1947 | % |
|---|---|---|---|
| **GENERATION* (Net)** | | | |
| By Fuel Burning Plants | 18,221,331,000 | 17,111,269,000 | + 6.5 |
| By Water Power Plants | 7,466,584,000 | 6,419,684,000 | +16.3 |
| **Total Generation** | **25,687,915,000** | **23,530,953,000** | **+ 9.2** |
| Add—Imports Over International Boundaries | 75,100,000 | 79,985,000 | − 6.1 |
| Less—Company Use | 129,000,000 | 139,927,000 | − 7.8 |
| Less—Energy Used by Producer | 372,488,000 | 549,328,000 | −32.2 |
| **Net Energy for Distribution** | **25,261,527,000** | **22,921,683,000** | **+10.2** |
| Losses and Unaccounted for | 3,796,421,000 | 3,304,642,000 | +14.9 |
| **Sales to Ultimate Customers** | **21,465,106,000** | **19,617,041,000** | **+ 9.4** |

### CLASSIFICATION OF SALES

| | | | |
|---|---|---|---|
| **NUMBER OF CUSTOMERS—As of December 31st** | | | |
| Residential or Domestic | 33,549,396 | 31,621,959 | + 6.1 |
| Rural (Distinct Rural Rates) | 1,694,579 | 1,522,136 | +11.3 |
| Commercial or Industrial: | | | |
| Small Light and Power | 5,131,730 | 4,960,895 | + 3.4 |
| Large Light and Power | 204,230 | 191,363 | + 6.7 |
| Other Customers | 142,053 | 135,597 | + 4.8 |
| **Total Ultimate Customers** | **40,721,988** | **38,431,950** | **+ 6.0** |
| **KILOWATTHOUR SALES—During Month of December** | | | |
| Residential or Domestic | 4,958,913,000 | 4,329,401,000 | +14.5 |
| Rural (Distinct Rural Rates) | 471,602,000 | 379,101,000 | +24.4 |
| Commercial or Industrial: | | | |
| Small Light and Power | 3,822,945,000 | 3,490,011,000 | + 9.5 |
| Large Light and Power | 10,720,045,000 | 9,934,205,000 | + 7.9 |
| Street and Highway Lighting | 269,980,000 | 250,818,000 | + 7.6 |
| Other Public Authorities | 557,428,000 | 529,745,000 | + 5.2 |
| Railways and Railroads: | | | |
| Street and Interurban Railways | 374,146,000 | 408,593,000 | − 8.4 |
| Electrified Steam Railroads | 238,393,000 | 239,364,000 | − 0.4 |
| Interdepartmental | 51,654,000 | 55,803,000 | − 7.4 |
| **Total to Ultimate Customers** | **21,465,106,000** | **19,617,041,000** | **+ 9.4** |
| **Revenue from Ultimate Customers** | **$390,128,300** | **$351,460,200** | **+11.0** |

### RESIDENTIAL OR DOMESTIC SERVICE

| | | | |
|---|---|---|---|
| **AVERAGE CUSTOMER DATA—For 12 months ended December 31st** | | | |
| Kilowatthours per Customer | 1,563 | 1,438 | + 8.7 |
| Average Annual Bill | $47.05 | $44.43 | + 5.9 |
| Revenue per Kilowatthour | 3.01¢ | 3.09¢ | − 2.6 |

(*) By courtesy of the Federal Power Commission.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 17 MARCH, 1949 No. 3

# Timely Subjects, Distinguished Speakers On Program Arranged for 17th Annual EEI Convention

WITH final arrangements rapidly nearing completion, the program for EEI's 17th Annual Convention in Atlantic City, May 31 to June 2, promises to bring before an expected large attendance of delegates an exceptionally fine slate of speakers to discuss topics of great significance and timely interest to the electric industry.

More than twenty distinguished executives from within as well as outside the industry will deliver addresses before the seven sessions of the convention. Following completion of program details, the speakers' names will be announced, and full coverage will be given in the next issue of the BULLETIN.

At this time it can be pointed out that the Program Committee, headed by Chairman W. C. Beckjord, President of The Cincinnati Gas and Electric Company, has sought, and has been eminently successful in finding, the ultimate authority on each of a variety of subjects, including different phases of financing, rates, engineering developments, sales, taxation, and public, investor and employee relations.

Ten of these top-flight speakers will address the three general sessions, and the others will speak at four parallel sessions. These special parallel sessions represent an innovation in convention planning and are designed to focus executive attention on specific fields of major importance to members of electric company management.

W. C. BECKJORD
*Chairman, Convention Program Committee*

Each of the three general sessions will be held in the Ballroom of the Atlantic City Convention Hall, and, as the program reveals, the subjects to be dealt with are of such wide appeal that the huge capacity of this auditorium should be well utilized.

An integral part of the first two general sessions, scheduled for Tuesday afternoon, May 31, and Wednesday morning, June 1, will be a reaffirmation of faith in the benefits of the free enterprise system. The deep significance that this belief holds for the electric industry will be brought out in discussions of the relation of the Federal government to electric power, expanded uses of electricity, economy and efficiency in operations, and utility financing.

C. E. KOHLHEPP
*Member, Convention Program Committee*

MCGREGOR SMITH
*Member, Convention Program Committee*

The third general session, to be held on Thursday morning, June 2, will be devoted to three "relations" of intimate concern to electric companies—investor relations, public relations, and employee relations.

With their greater emphasis on individual areas of electric company operation, the four parallel sessions have been given positions of paramount importance on Wednesday and Thursday afternoons, June 1 and 2, and have been assigned to the Vernon Room and the Rutland Room of the Haddon Hall Hotel to make sure that the expected large number of delegates attending will be comfortably accommodated.

Paired for Wednesday afternoon, June 1, are two sessions concentrating on widely differing but equally important fields. A review of war and postwar achievements of the utilities will constitute the keynote address of a session devoted to engineering and will be followed by discussions of thermal prime mover development, distribution, and standardization. Rates will be the theme of the corresponding session, with specific conferences to rate increases, problems of residential rates, and the legal presentation of rate problems.

On Thursday afternoon, June 2, the final two parallel sessions will be held, one given over to commercial activities, the other composed of discussions of financial and economic trends and problems.

"We must" is the key phrase applying to the addresses of the commercial session, which will demonstrate that "we must sell aggressively today," "we must sell selectively and economically," and "we must use our sales organizations to sell our industry." As an added attraction, there will be a showing of the new kitchen film, "The Constant Bride," now being used extensively in the recently launched All-Electric Kitchen Program.

A three-man dissertation on financing will lead off the other half of Thursday's parallel program. Included in this session will be discussions of lease-back financing, the impact of taxation, general economics and price levels from the broad viewpoint.

In addition to the planning of this unusual and promising business program, considerable attention has been given to the arrangement of recreational and social functions, so that, while business will quite properly come before pleasure, periods of relaxation will not lag far behind. The first of these "breaks" will be a cocktail party at the Traymore Hotel on Tuesday evening from 5 to 7, at which EEI delegates will be guests of the Westinghouse Electric Corporation.

The following day, at noon, the ladies will be guests of the Frigidaire Division of General Motors Corporation at a luncheon to be given on the garden terrace of the Brighton Hotel. As a novel entertainment for the ladies, an "aquacade" will be provided, as swimmers perform in the Brighton's fine pool.

All the EEI delegates will be welcomed at a cocktail party to be given Wednesday evening from 5 to 7 at the Traymore, at which the General Electric Company will be host.

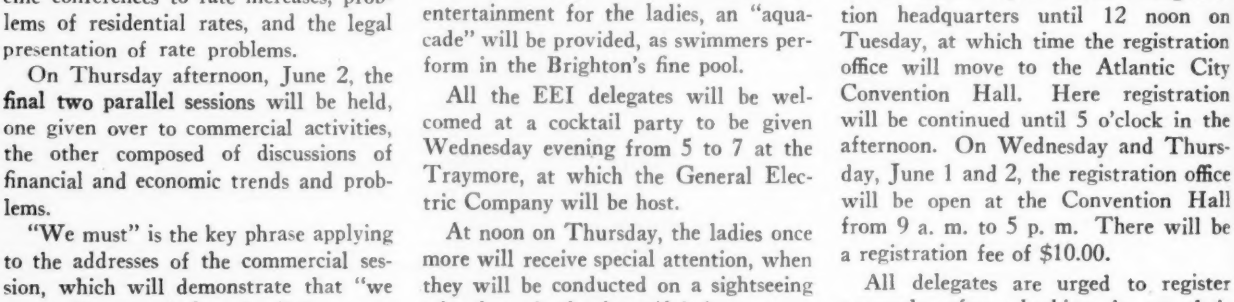
At noon on Thursday, the ladies once more will receive special attention, when they will be conducted on a sightseeing trip through the beautiful farm country of southern New Jersey. Included in this excursion will be a tour through the famous Seabrook Farms, the world's largest fruit and vegetable processing farm. As a climax, a luncheon consisting of food frozen on the premises will be served.

To cap the convention in fitting fashion, all the delegates will be invited to an EEI Buffet at the Traymore at 7 on Thursday evening. Included in the Buffet program, to follow supper, will be dancing, and a special entertainment feature which will be announced later.

It is extremely important for all those who are planning to attend the convention to make their hotel reservations early. Hotel circulars containing application blanks for hotel reservations have already been mailed to member companies, and emphasis is given to the fact that the convention occurs immediately after the three-day Decoration Day weekend. This means that hotel accommodations for convention time will be in great demand, not only for EEI delegates but for weekenders preparing to enjoy their first long holiday of the season.

Delegates will be able to commence registration at the convention at 9 a. m., Tuesday, May 31, at the Traymore Hotel. The Traymore will be registration headquarters until 12 noon on Tuesday, at which time the registration office will move to the Atlantic City Convention Hall. Here registration will be continued until 5 o'clock in the afternoon. On Wednesday and Thursday, June 1 and 2, the registration office will be open at the Convention Hall from 9 a. m. to 5 p. m. There will be a registration fee of $10.00.

All delegates are urged to register promptly after checking in at their hotels. It is pointed out that *admittance to all business sessions and social functions will be by convention badge only.* This all-important identification can be obtained only when the delegate registers.



*A Panorama of Atlantic City's World-Famous Surf and Boardwalk Hotels*

# Fifteenth Annual EEI Sales Conference To Draw Capacity Attendance with Many-Sided Program

THE Fifteenth Annual Sales Conference of the Edison Electric Institute, to be held at the Edgewater Beach Hotel, Chicago, Ill., April 4-7, will offer a program of rare interest to electric utility commercial men, with an array of subjects and speakers that have been carefully selected to cover problems of major importance to the commercial future of our industry. Advance reservations indicate another record-breaking attendance for this meeting, with close to 1000 representatives of electric companies, appliance manufacturers, national and trade magazines, and others scheduled to attend.

An innovation at this year's Sales Conference will be an all-day meeting for home service personnel, on Monday, April 4. The committees of the Commercial Division have all scheduled meetings for the same day.

The Residential, Industrial Power and Heating, Commercial Sales and Farm Sections have prepared programs for all-day conferences on Tuesday, April 5. General Sessions are listed for Wednesday, April 6 and the morning of Thursday, April 7. The Sales Conference will close with a luncheon session on Thursday.

### General Sessions Program

Harry Restofski, Chairman of the EEI Commercial Division General Committee, and General Sales Manager, West Penn Power Co., will preside at the General Sessions. Mr. Restofski's remarks will open the initial sessions at 10:00 a.m., on April 6. The first session will feature an address by Merryle Stanley Rukeyser, noted lecturer and business news columnist, and a talk on agriculture and its importance to our industry by Dr. Paul D. Sanders, editor of the *Southern Planter*, Richmond, Va. "The Constant Bride," color motion picture prepared as part of the new All-Electric Kitchen Program, will be shown during the session.

On Wednesday afternoon the audience will see a dramatic presentation entitled "The Lighting Load Is the Mother Lode," which will enlist the talents of several members of our industry and the lighting manufacturers. Fred Compton, General Sales Manager, The Detroit Edison Co., will discuss the possibilities of television as a load-builder, and Nathaniel Leverone, Chairman of the Board, Automatic Canteen Company of America, will present his ideas on the subject, "Understanding."

Ted Malone, radio commentator, will be heard during the afternoon with a real teaser subject, "E-Day Minus 55."

On Thursday morning, April 7, the Thomas W. Martin Rural Electrification Award, the George A. Hughes Award for electric cooking and water heating promotion, and the Laura McCall Home Service Award will be presented to the winners by H. M. Sawyer, Chairman of the EEI Prize Awards Committee. The rest of the morning will be filled by the Westinghouse Electric Corporation's Productive Power Show, which will dramatize the latest and most effective applications of electricity in industry.

The closing luncheon session will hear from Ernest R. Acker, President of the Institute, who will review the current status of the industry. J. B. Thomas, President, Texas Electric Service Co., will speak on the need for better public understanding of our industry.

### Home Service Conference

The conference on home service, to be held Monday, April 4, will be under the leadership of Miss Lucille Johnson, Chairman of the EEI Home Service Committee.

Miss Clara Zillessen, Philadelphia Electric Co., will lead a discussion on the topic, "Role of Home Service in Promoting Electrical Living." The morning session will also hear from Frances Armin, National Adequate Wiring Bureau; Adelaide Fellows, Philco Corp., and Myrtle Fahsbender, Westinghouse Electric Corp.

C. A. Collier, Vice President of the Georgia Power Co., will lead off in the afternoon session with a talk on "Measuring Home Service Results." New techniques in electric range demonstrations will be presented by Julia Kiene, Westinghouse; and J. R. Poteat, General Electric Co., will demonstrate the newest developments in electric cooking.

### Sectional Programs

For its all-day meeting on Tuesday, April 5, the Industrial Power and Heating Section has planned an extensive program. J. R. Hartman, Chairman of the Section and Robert G. Ely, Vice Chairman, will preside at the session, which will hear such speakers as W. V. O'Brien, General Sales Manager, Apparatus Dept., General Electric Co., on "Our Expanding Economy—A Forecast of Basic Trends"; Warren Brooks, The Cleveland Electric Illuminating Co., on "Selling Industrial Service at Higher Prices"; Maxwell Cole, Philadelphia Electric Co., speaking on "Market Analysis to Build Future Sales"; W. A. MacCalla, West Penn Power Co., who will discuss "Present Customers—Our Future 'Bonanza'"; J. H. Coates, Ebasco Services Inc., on "Reducing Unit Sales Costs," and Carl T. Bremicker, Northern States Power Co., with an address entitled "Trouble Guaranteed."

The Farm Section, with J. C. Cahill, Section Chairman, presiding, will hear reports of the Agricultural Development and Farm Utilization Committees by Fred M. Shaw and John L. Burgan, respective committee chairmen. Among other speakers to appear on the platform are Herman Gallagher, Consumers Power Co.; Dr. Harlan English, Chairman of the Committee on Rural Medical Service, Illinois State Medical Society; A. G. Brown, Director, Agricultural Commission, American Bankers Association, and J. V. Baker, Manager, Farm Electrification, Sears Roebuck & Co.

At the Farm Section Luncheon on Tuesday, Dr. William I. Myers, Dean of Agriculture, Cornell University, will speak on "What's Ahead for Farm Electrification."

The Commercial Sales Section, with Luther T. Cale, Chairman of the Com-

mercial Cooking Committee, and George E. Korten, Chairman, Street Lighting Coordination Committee, serving as conference chairmen, will hear from C. A. Stevens, Section Chairman; Frank L. Sacha, Manager, Sales Division, Commercial Cooking Equipment Dept., Hotpoint, Inc.; T. J. Scully, General Sales Manager, Griswold Manufacturing Co., and Dan Clark, well-known restaurateur of South Bend, Ind.

**Planned Lighting Clinics to Be Discussed**

J. M. Stedman, General Sales Manager, Pennsylvania Power & Light Co., will discuss the experiences of his company with its recently sponsored Planned Lighting Clinics, which have trained local dealers, distributors and contractors in the preparation of lighting installation plans. Charles R. Cornic, Business Manager, Board of Education, Birmingham, Ala., will describe the school lighting program recently launched by that city.

The Residential Section, with H. A. Stroud, Section Chairman, presiding, will hear E. O. George, The Detroit Edison Co., analyze the load-building potential of the automatic home laundry. Talks on the possibilities of the home freezer, and the present outlook for appliances, will be delivered by a NEMA representative and T. J. Newcomb, Westinghouse Electric Corp.

**"All Aboard"**

A skit entitled "All Aboard" will be presented by the EEI Electric Kitchen and Laundry Committee, heralding the new All-Electric Kitchen promotional program which has just been released by this committee.

The afternoon session will feature H. H. Brenan, Pennsylvania Power & Light Co., with a talk on his company's recent successful promotion of CLM lamps, and a symposium on the new sight-light educational program for grade school classes prepared by the Better Light-Better Sight Bureau, which will be handled by Robert I. Bull, The Ohio Power Co., and L. R. Cole, West Penn Power Co. "The New Look in Home Service" will be described by Miss Leonora O'Neal, Gulf States Utilities Co., and the problem of "Recruiting Home Service Women" will be discussed by Mrs. Mariquita Dygert, The Detroit Edison Co.

George W. Wallace, Television Network Sales Promotion Manager for NBC, will conclude the meeting with a discussion of television as a promotional medium for electric companies, and its ability to help customers learn about appliances, services and ideas for Electrical Living.

# Joint Research Committee on Boiler Feedwater Studies Reports Progress in 1948

ACTIVITIES of the Joint Research Committee on Boiler Feedwater Studies in 1948 were mainly directed toward a coordinated examination of boiler operation problems through programs and papers co-sponsored with various technical societies.

New subcommittees on deposits, corrosion and steam contamination have been formed in the past year as part of a general reorganization of the subcommittees of the Joint Research Committee. During the year the Engineering Experiment Station of the Department of the Navy resumed its participation in the work of the Committee and has appointed R. C. Adams as their representative on the executive committee.

Programs and papers sponsored in 1948 covered a wide variety of subjects pertinent to the boiler feedwater studies. In May, a program sponsored jointly with the American Railway Engineers Association at the annual meeting of the American Water Works Association in Atlantic City, N. J., dealt with water treating problems of particular importance in locomotive operation. The Joint Research Committee co-sponsored a program at the annual meeting in June of the American Society for Testing Materials at Detroit on corrosion problems in boiler operation. Also in June the committee co-sponsored a program on turbine blade deposits and steam contamination at the semi-annual meeting of the American Society of Mechanical Engineers in Milwaukee.

**Cooperation with ASME**

At the 1948 annual meeting of the American Society of Mechanical Engineers in New York, the Joint Research Committee cooperated with the Power Division on a program concerned with corrosion problems in high pressure boilers and devoted particular attention to discussion of hydrogen embrittlement.

The reorganization of the subcommittees of the Joint Research Committee was completed toward the end of the year. Much of the work, for which the earlier subcommittees had been organized, has been completed and the need for their particular functions has therefore disappeared. The new organization provides for subcommittees as follows: Subcommittee on Deposits, Chairman, R. C. Bardwell, Superintendent of Water Supply, Chesapeake & Ohio Ry. Co.; Subcommittee on Corrosion, Chairman, Dr. E. P. Partridge, Director of Research, Hall Laboratories, Inc.; and Subcommittee on Steam Contamination, Chairman, W. L. Webb, American Gas & Electric Service Co.

**New Subcommittees Organized**

The subcommittee chairmen are now organizing the memberships of their committees and studying the problems which are of prime importance in the field under their jurisdiction. As a result of this work, it is expected that during 1949 the Joint Research Committee will sponsor further society activities and papers on various phases of boiler water treatment and may suggest some research problems to which the committee should devote particular attention.

**Dr. Whirl to Represent EEI**

Dr. W. C. Schroeder, Chief, Office of Synthetic Liquid Fuels, Bureau of Mines, heads, as Chairman, the staff of new committee officers who took over their duties in 1948. Dr. S. F. Whirl, elected 1st Vice Chairman, was appointed to membership on the Executive Committee as representative of the Edison Electric Institute, a position left vacant by the resignation of E. H. Tenney. Other new officers of the committee are: R. W. Seniff, Engineer of Tests, Baltimore & Ohio Railroad, 2nd Vice Chairman; and Dr. T. H. Daugherty, Research Chemist, Hall Laboratories, Inc., Secretary.

# Financing the Future Expansion of the Electric Utility Industry

**By George D. Woods**

*Chairman of the Executive Committee, The First Boston Corporation*

An address before the Westinghouse Electric Corporation Future Power Market Forum at Pittsburgh, Pennsylvania, February 17, 1949

AT THE outset it may be said that there should be no difficulty in financing the current expansion of your industry. There are no insurmountable problems. I am convinced that funds are abundantly available from the savings of the American public. The principal ingredients required to achieve the objective are reasonably intelligent and reasonably understanding cooperation between utility managements, regulatory bodies and security dealers, plus plain, old-fashioned hard work. There are, however, a few red lights, as well as certain trends which may develop into danger signals, which I would like to discuss.

### Ready Market for Debt Securities

It is estimated that the expansion of your industry over the next three years will require a minimum of three to three and one-half billion dollars over and above the funds available to you from so-called internal sources. That is, principally from your reserves and balances available after the payment of dividends.

The largest proportion of this sum will be raised through the sale of debt securities. In my judgment you will find a ready market for all your debt securities. The interest rates which you pay will vary somewhat among the individual companies and the interest rate will be quite low if it is compared with the rates of interest paid during the last period of substantial expansion in your industry in the middle 1920's.

Your debt securities will be taken in large part by institutional investors. During the 1920's your bonds and debentures were distributed by security dealers largely to individuals, and the cost of that widespread distribution was considerably greater than the costs which you will pay under present conditions. This is natural and proper inasmuch as not more than perhaps 75 institutions will take upwards of 75 per cent of your debt securities, and the effort expended by the security dealers is therefore very much less than it was when the securities were sold to tens of thousands of investors throughout the country.

The supply of funds which the institutions will have for investment should increase as long as the adoption of pension funds continues to spread. Furthermore, it is evident that a return to price levels of the 1920's is exceedingly remote, and the average individual is forced to carry more life insurance than he did when the purchasing power of the dollar was higher. There are other factors which work in the same direction, but for our purpose it is sufficient to state that your debt financing will cause you no trouble.

At this point I would like to inject a note of caution and a word of advice. Because of the ease with which debt securities can be sold, do not be tempted to create the maximum amount of debt which your trust indenture permits. Always have a balance of bondable additions against which no bonds have been issued to take care of the inevitable rainy day when conditions are such that equity financing is not available on any practical terms.

### Increase Your Equity

Do not be tempted by the combination of low rent for the capital and the fact that this rent, in the form of interest payments, is a deduction for income tax purposes, whereas the rent for your equity capital represented by preferred and common dividends is not only higher but is not deductible for income tax purposes. Keep your debt low and expend your efforts on increasing your equity.

I would like to comment briefly on the convertible debenture vehicle which has been used from time to time as a medium for financing expansion. A convertible debenture is a debt obligation, is defaultable, and is calculated as debt in statistical comparisons until it is converted. If, subsequent to its creation and prior to its conversion into stock, a change should occur — not necessarily in the business of the issuer but in the general economic picture of the country and in the Stock Exchange averages for all utility stocks—the privilege of converson might become meaningless, and what was felt by a management and its financial adviser to be a temporary step in the direction of distributing common stock could turn out to be a permanent item in the debt column, usually with a relatively short maturity.

### Convertible Debenture Hazards

In my judgment the convertible debenture device for distributing equity securities of electric utilities should be used with extreme care. When used, the conversion price should be very close to or even below the quoted market for the common stock, and the management and its financial adviser should take all appropriate steps to effect conversions reasonably promptly. There are few sound reasons for an electric utility to employ the medium of convertible debentures for raising permanent capital, and I advise you to examine your situation with great care before you adopt it.

The smaller portion of your requirements to finance your expansion programs must come from the sale of preferred and common stock. This is vitally necessary to maintain the integrity of your debt obligations. In fact, my complacency about your ability to market your debt securities in 1949, 1950 and 1951 is predicated on the assumption that you will sell equity securities to investors during these years and sell them in quantity.

In my opinion your preferred and common stocks can be sold. However, in this area of equity financing there is a clear red light. It is in this area that real teamwork between management,

regulatory bodies, and security dealers is required. To obtain a proper perspective I am going to take a few minutes to review what has happened in the past few years.

In 1946, at the height of the era of refunding operating electric utility company preferred stocks, the dividend yield to the investor on a few preferreds was as low as 3.25 per cent, and for the average good electric utility it was between 3.35 per cent and 3.60 per cent. This return for the investment of capital was of course inadequate. It was artificially low. However, many million of dollars of your preferred stocks were sold in that period, and as the unnatural situation corrected itself and investors demanded more realistic rates, the market quotations for preferred stocks with the 3.40 per cent to 3.80 per cent dividend rates reflected the change. Many of these preferreds are today quoted in the 80's and the investors, largely institutions, have not as yet recovered from the impact of the depreciation indicated by these quotations.

### Preferred Stock Sales

Under present conditions preferred stocks of good operating electric utility companies can be sold with a dividend rate of from 4¼ per cent to 4½ per cent. It has been my personal feeling that as the going rate approaches closer to 5 per cent your preferred stocks will be readily saleable in substantial quantity to individuals and miscellaneous institutional investors through the length and breadth of the land. Then, too, at these levels there is always the possibility that the large life insurance companies will again be interested inasmuch as the likelihood that preferred stocks bought at these yields will sell at a discount is not very great.

At this point I would like to interject a word of advice in connection with your preferred stocks. I do not feel that the large institutions represent the market to which most of you should primarily address yourselves in raising the preferred stock segment of your capital. I do not feel that it is sound from your viewpoint to accede to the universal suggestion of the large life insurance companies that you provide for a sinking fund or a purchase fund in connection with your preferred stocks and thereby achieve a saving of a fraction of 1 per cent in the dividend rate plus a reduction in the cost of underwriting and distribution. It is my belief that you should recognize preferred stock as a permanent part of your capitalization and that you should pay the rate and stand the expense necessary to obtain that capital from the individual and small institutional investor.

### Small Block Sales

This involves recognizing the increased task of the security dealers in distributing the stock in blocks of from $1,000 to $10,000 rather than from $100,000 to $1,000,000, and paying the increased expense in the form of underwriting and distributing costs which this entails. In this connection it must be observed that the large life insurance companies have a very real problem in that they are required to carry their preferred stock investments at market quotations at the year end. The sinking fund or purchase fund suggestions represent a sincere effort on their part to answer their problem.

In certain states, committees of life insurance representatives are endeavoring to work out a satisfactory solution with the appropriate insurance commissioners and superintendents. The efforts of these committees, if successful, could result in the large life insurance companies' again being an important factor in the market for your preferred stock issues.

During the past 3 years the common stocks of upwards of 40 operating utilities have become available to investors, and as of the present time the common stocks of upwards of 120 operating electric utility companies are outstanding with the public. Ten years ago there were only a handful of major operating electric utility common stocks outstanding with the public—perhaps 15 or 18 companies were not entirely or substantially owned in one or another of the holding company systems. At a point in the first half of 1946 the dividend yield to the investor on many of your common stocks was well below 5 per cent, some of them approaching a low of 4 per cent. As of the present time the lowest yield on a few electric utility common stocks is about 4.80 per cent, the highest yield is 10 per cent, and the average is about 7 per cent.

Recently my attention was called to some figures which deserve consideration. They show that at the high point of the stock market in 1948 the utility commons were selling 17½ per cent below the high point of 1946, the industrials were about 9 per cent below the 1946 high, and the rails only about 5 per cent below the 1946 high. In 1948 the rails were selling 51 per cent higher than the 1947 lows which followed the 1946 peaks, the industrials were 18 per cent above the 1947 lows, and the utilities were only about 11½ per cent above the 1947 lows. In other words, the utility commons did not come back with the others although they had declined with them.

Through the refunding operations most of your debt and much of your preferred stock passed from the safe deposit boxes of individual investors to the vaults of the large institutions. This transfer left individuals in funds and over the past few years they have purchased many millions of dollars of operating companies' common stocks in connection with the liquidation of the holding companies. On the basis of experience in the recent past the investor in your preferred stock and your common stock is not particularly happy.

### A "Fair Deal" for Investors

Of course he is not particularly unhappy either, as he still feels his income is safe. But generally speaking the security he bought is selling lower than he paid for it rather than higher, and he is definitely from Missouri—he is talking about a "fair deal"—when it comes to making further investments in electric utility stocks. Let's face the fact: Your equity stocks are going to have to be sold. Investors are not going to telephone in and ask to buy them.

The competition is keen for that segment of the country's savings which annually go into equity stocks which are issued for new capital. There is a glamor about industrial common stocks which has a surface appeal to investors, and in recent years there has been a profit incident to their sale which has a very practical appeal to the security dealers of the country.

You are in a business which is an absolute necessity for day-to-day existence. It is in the public interest that it be financed. If it is not financed with private capital, raised through the machinery established for that purpose, in competition with other requirements for private capital, then it will ultimately be financed through the credit of the Government. This is a possibility which no utility executive and no security dealer likes to contemplate, and only an infinitesimal percentage of those identified

with the regulatory bodies would favor.

In 1948 about $150,000,000 was raised from the sale of preferred stock by the electric utility industry and only about $100,000,000 came from the sale of common stock. In both cases the figures are for new money and exclude sales for holding company account. I have no way of proving it, and therefore I state it as my own unsupported opinion, that the amount of money raised from the sale of preferred stock was about right and the amount raised from the sale of common stock was about half of what should have been raised to support sound capital structures.

It is estimated that about $300,000,000 of new money will have to be raised by the industry in 1949 from the proceeds of common stock, plus about $125,000,000 from the sale of preferred stock. These figures, like all estimates, are educated guesses. My own feeling is that they are definitely on the low side and that larger sums should be raised. So now we have the question. In the light of recent history and with a knowledge of the order of magnitude of the job, what steps can be taken to sell the securities and raise the money?

### The Effect of Rate Increases

A tidal wave of rate increases throughout the country would bring an almost overnight change in the attitude of professional analysts and investors toward your common stocks. However, tidal waves are difficult to arrange and we will probably have to settle for an ascending wave and a gradual change. In fairness it must be recognized that, by and large, regulatory bodies are taking a favorable attitude toward rate increases. In 1948 about 90 electric utilities applied for rate increases and practically all applications were granted. All told, there are approximately 320 Class A and B electric operating utilities in the country. During this period approximately 150 government and municipal systems increased their rates.

Most utilities have done the relatively modest amount of economizing which is possible under present conditions. Taxes are beyond the control of managements. Payrolls and fuel costs are up. Federal Power Commission figures show operating ratios for electric utilities at 42.8 per cent in 1942, up to 45.8 per cent in 1945, on up to 48.2 per cent in 1946, and then to 52.8 per cent in 1947. The industrials almost universally pass higher taxes and wages along to the consumer in the form of higher prices. The rails are enjoying the two rate increases granted by the Interstate Commerce Commission in 1946 and in 1948.

It is, of course, impossible to make general statements relating to rate bases, rates of return and rate structures. These are matters which must be considered in the light of the circumstances surrounding individual cases. I do submit, however, that, generally speaking, rate increases are very much in order in the electric utility industry. The utility commissions have a dual responsibility. The rates they approve must be fair to the consumer but they must also be designed to attract needed new capital. This latter responsibility is a very real one today.

### New Capital at Higher Cost

The reductions in the interest and dividend requirements which your industry accomplished from 1935 to 1945, plus operating economies and improvements in operating efficiency, have enabled you to reduce rates in the past and at the same time to absorb increased taxes and increased costs for fuel and wages. Now you are faced with raising new capital at higher costs than prevailed in the refunding era and also with continued increases in operating costs.

While the facts vary in individual cases I am convinced that, generally speaking, rate increases are necessary to assure the sale of common stock and thereby to provide the keystone piece for your financing programs. Entirely aside from the tangible results, the cooperation of the regulatory bodies will be a complete answer to the feeling in some quarters that the utilities are a regulated industry and the regulation is always in the interests of the ratepayer rather than the common stock investor.

An equally spectacular overnight change would be accomplished with respect to investor interest in your common stocks if the Congress were to modify the existing unsound situation with respect to double taxation. This is probably too much to hope for, but it is something that should be continuously in the forefront of your minds when you are discussing the problems of financing your business with your utility commissioners, your congressmen, and your senators. Even if no action is obtained in Congress on this important question of economics (which seems to be bogged down in politics) in time to assist in financing your current expansion progress, continuous education of members of Congress may conceivably bring the desired sound result at a future time.

The sealed deadline bidding procedure severally handicaps the security dealers of the country in obtaining for your program a fair share of the funds which are available for equity investment. State and Federal regulatory bodies, despite the representations of reputable security dealers, have persisted in encouraging and at times ordering the sale of equity securities through the bidding procedure. The raising of new capital through the sale of preferred or common stock must be preceded by a well-conceived program to educate security dealers regarding the business, the management, and the past history of the issuer as well as the territory in which it operates. The bidding procedure drastically handicaps this necessary program of education and it encourages the unsound philosophy of endeavoring to sell your stock to the investor at the highest conceivable price.

### Moratorium on Sealed Deadline Bidding

Every action possible should be taken to bring about a moratorium of the sealed deadline bidding procedure with respect to the underwriting and distribution of your preferred and common stocks at least for a period sufficient to enable the intelligent and orderly distribution of the equity securities which you must sell to raise the capital necessary for your expansion program. And I wish to make it entirely clear that I urge this primarily in your own interests.

While I have more or less grown up in the field of utility financing, I find that I am spending a smaller and smaller proportion of my time on matters pertaining to utilities and a correspondingly larger amount of time in connection with the financing of industrial companies. This is true of many of my associates in The First Boston Corporation, and I am sure it is similarly true of men not only in other large underwriting firms, but the most disquieting fact is that it is also true in smaller security distributing firms throughout the country. This trend among the small security dealers must be arrested if your expansion is to be financed with the aid of private capital. It can be

stopped instantly and promptly reversed by the adoption of the negotiation procedure in the sale of equities, which will result in most instances in fair offering prices and adequate compensation for underwriting and distribution.

In the final analysis the financing of your expansion program must rest on the old tried-and-true foundationpiece, jawbone and leg work. Organizing to sell upwards of $425,000,000 of equity securities, a large portion of which is common stock, in 1949 with more to follow in 1950 and 1951 is a sizable undertaking. The job is not made easier by the background of the past three years which I have outlined to you. The objective is well worthwhile because the alternatives—either too much debt or assistance from the Government or both —must be avoided.

### Plain Hard Work

Being practical, we all know that it is pointless to rest on the hope that a spectacular event will remove all the hurdles, and we are inevitably led to the conclusion that plain hard work is the real answer. All utility executives, senior and junior, should make opportunities to talk the strong points of the electric utility business before all types of forums—the stability, the earnings record, and the enormous future prospects for the development of the business. If you have not already done so you should all get to know your local security dealers and sell them on the industry as a whole and on your company in particular.

I would like to see a general effort made to have members of the regulatory bodies and their staffs encouraged to make talks on their philosophies of regulation and their viewpoints regarding the future of the electric utility business and the business of the particular utilities which they regulate. One of the best ways to combat the spread of public ownership, which if carried to the ultimate would have the by-product result of curtailing and possibly eliminating the activities of the regulatory bodies, is to have a financially strong privately owned electric utility industry. Viewed in this light the education of the investing public on the present soundness and the bright future prospects of electric utilities for the purpose of encouraging equity investments is a crusade which management and regulatory personnel can carry on shoulder to shoulder.

The biggest part of the equity job must be done by about 800 security dealers throughout the country. They must do the legwork to reach thousands of private investors. They have the training, they know where the investors are, and during 1948 they gave tangible evidence on several occasions of their ability to do their job when they understand the facts relating to the commodity they have for sale and the profit incentive is sufficient.

While they will need help from you as management in certain instances, you will find that security dealers when properly guided will aggressively and successfully advocate your case with the investment trusts where the yardstick sights on the percentage of total assets which are invested in the electric utility industry are too low; with the myriad of investment counselors and advisers throughout the country who in my opinion must also raise their sights on the amount of electric utility common stocks a well-balanced portfolio should include; with the life insurance people in the 33 states of the Union where it is today legal for those institutions to invest in common stocks; as well as with the life insurance companies and the insurance superintendents in certain other states which are now considering enabling legislation to permit such investments.

Aggressively advocate your rate increases. Aggressively move to obtain a moratorium of the sealed competitive bidding procedure with respect to the sale of equity securities. Aggressively sell your industry and your particular company at every opportunity. Avoid overpricing the new issues of preferred and common stocks and underpaying the security dealers in connection with their distribution. After all, considering the prices you pay for materials, supplies and labor, 4¼ per cent to 5 per cent for preferred stock money and 6½ per cent to 7½ per cent for common stock money—and most of you will be within those brackets—is not unreasonable.

Performance on these few fundamental points will, I am confident, assure your 1949 program and leave you in a strong and healthy condition to meet whatever the problems may be in connection with your 1950 and 1951 financing.

# Ebasco Sponsors Safety Seminar

A SEMINAR in Public Utility Safety, sponsored by Ebasco Services Inc. in cooperation with New York University, believed to be the first of its kind, was conducted in New York City for two weeks from Feb. 21 to Mar. 4, 1949. "Tailor made" for Ebasco client company safety and operating personnel, the seminar stressed the teaching of modern practices and techniques in accident prevention administration and acquaintance with the latest developments in the field.

The seminar was conducted with approximately one-half the time spent at New York University and the other half in field visits, instructional work and conferences at Ebasco offices. The seminar included the following subjects: effective speaking, effective relations (practical psychology), conference leadership and safety training, utility safety programs, motor vehicle safety, visual aids, fire prevention and protection, field visits and an Association Panel.

With the realization that safety work is becoming more complex and that most safety men in utilities are picked from the ranks," it was felt that some formal training in safety organization, procedures and techniques together with some instruction and actual practice in speaking and instruction in effective human relationship would be highly beneficial. It was believed that such specialized training would benefit the experienced men in safety work as a "refresher" course in addition to being helpful to the new men entering this work.

Field trips included visits to the training school of the New York Telephone Company at Long Island City; to the Waterside Plant and head offices of Consolidated Edison Company of New York; and to Walter Kidde Company at Belleville, N. J., for demonstration of first-aid fire extinguishing equipment. The Association Panel, a unique feature of the seminar, was held at headquarters of the American Gas Association, 420 Lexington Avenue. Representatives of the accident prevention activities of the American Gas Association, Edison Electric Institute, American Transit Association, American Institute of Electrical Engineers,

(*Continued on page* 78)

# Telephone Company Mobile Radiotelephone for Power Utility Use

By R. E. Kolo

*Radio Engineer, Cincinnati and Suburban Bell Telephone Company*

**Abstract of paper presented before the EEI Transmission and Distribution Committee Meeting at Cincinnati, Ohio, February 10, 1949**

THE mobile radiotelephone is a very useful tool in the daily operations of power utilities as is evidenced by the trade journals which offer impressive statistics on the use of the radiotelephone in the various services provided by the electric power industry.

### Electric Power Co. Needs

In the face of this publicity it seems unnecessary to restate the value of the mobile radiotelephone in the conduct of your business. However, it may be worthwhile to list a few of the important usages following the fashion set by electric utility representatives in the recent frequency allocation hearings before the Federal Communications Commission. Some of the points made in support of the need for mobile radiotelephone are as follows:

Protect life and property and speed up the restoration of service to industrial areas that might be affected by interruptions of their power source.

Dispatch repair and construction crews when and where needed.

Report "on-the-spot" information to dispatcher after crew has reached the location of trouble and secure assistance when needed.

Enable crews and repairmen to call dispatcher promptly regarding new assignments.

Coordinate the work of several crews when engaged in patrolling and checking long sections of line in order to find or isolate the trouble, to reroute lines to furnish service to the point of break and to maintain service over other routes.

Coordinate the work of construction crews during stringing and sagging operations.

Redirect equipment and supplies in transit and expedite the ordering of additional equipment and supplies.

Keep key people in personal touch with activities during emergency situations.

Enable supervisors, foremen, and inspectors to make and receive calls in their cars instead of driving to the nearest telephone.

Dispatch investigator to scene of accident to obtain information on cause of accident.

Save time and loss to customers in getting repairs under way by contacting repairmen en route in vicinity of trouble locations.

### Service Offering

The Telephone Company offers two types of radiotelephone service for your consideration. A private system, engineered to suit your special purposes, is available. The common carrier system is also available and may be used to good advantage as later described.

The common carrier services are divided into three types. The general service contemplates the full use of your normal telephone facilities. Fig. 1, a block diagram, illustrates the arrangements. For those making a large number of calls from fixed locations, such as a load control point, a service known as dispatching service is offered. A telephone directly connected to the radiotelephone operating position is provided. This service features a lowered cost and a somewhat faster speed per call.

There is also offered a signalling-only service wherein only a receiver is installed in the vehicle. Calls directed to this vehicle ring a bell and light a signal lamp to advise the driver to proceed according to prearranged plans. This type of service may be useful in areas where the range of the land station greatly exceeds that of the mobile station.

### Private Systems

The private systems are the type generally considered in most of your trade papers. Widespread publicity has been given them in connection with representations before the Federal Communications Commission regarding frequency allocations. Many have assumed that private systems offer the best arrangement for the power utilities, possibly because it was feared that the service could not be reserved as required during emergency.

For small companies this sort of arrangement is practicable inasmuch as the load on the channel is moderate and the control can be made effective. However, where the loads are large or operations are widespread, the use of the private system has limitations.

### Common Carrier System

The common carrier system of operation offers certain advantages to the power utilities with larger operations. This service is designed on the basis of serving the general public and as such is connected in with the general telephone network. This in itself is a very important advantage in that the least limitations are placed upon your personnel in reaching your radio-equipped vehicles. Management personnel may call field supervisors from home or from the office with equal facility.

The common carrier system in most communities consists of more than one channel in the service of the general public. The mobile units serving the utility can be associated therefore, with more than one channel and in addition to the benefit of the connection to the telephone network there are the greater possibilities of reaching some mobile units in the event a channel was found to be busy.

In cities like Cincinnati, where there are now three channels working, and where the fourth will shortly be in service, the advantage may be understood. There are certain other advantages of using the common carrier system when there are several radio stations in this service. The risk of a general outage is

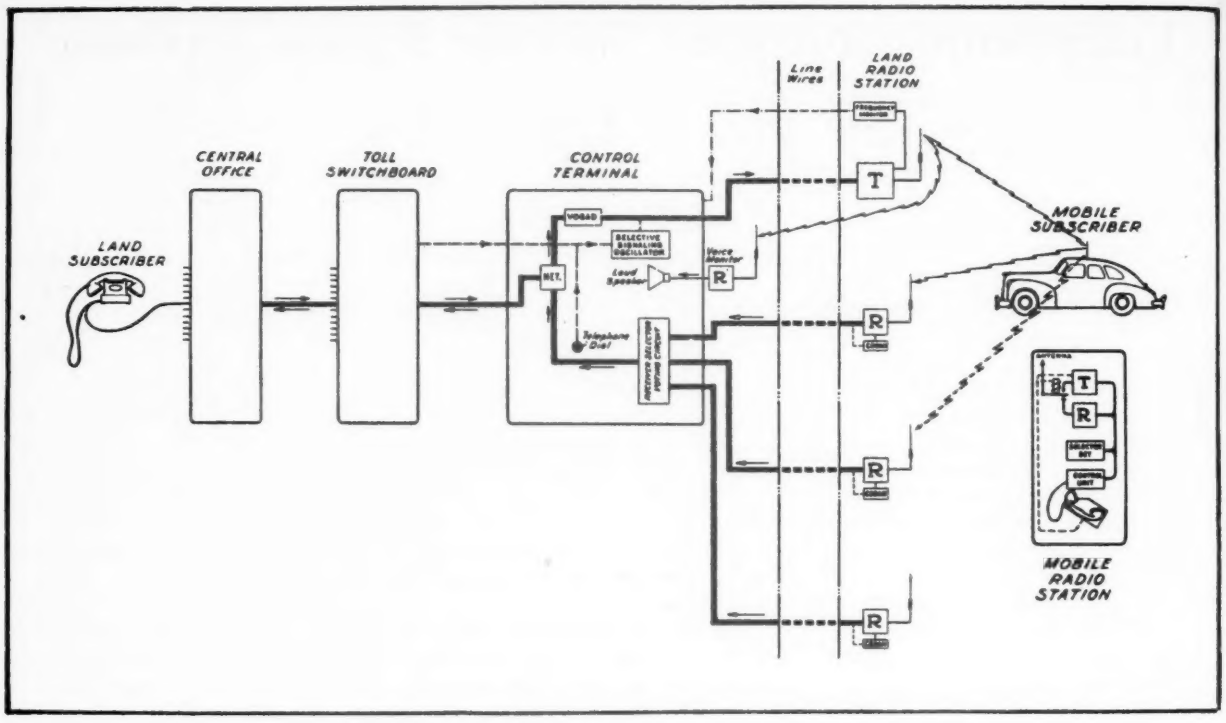



*Fig. 1—General Mobile Radiotelephone System Block Diagram*

lessened since it is unlikely that all channels would fail at the same time.

**Pooled Systems**

Being able to secure your service as part of a large pool of facilities is advantageous from the cost angle. The consolidation of the control equipment permits the minimum in personnel requirements. In the case of the transmitters at the Wabash Exchange, several are easily maintained by one technical operator. This results in reduced costs per unit and is of course reflected in the rates you pay for the service.

Your attention is directed to some additional advantages obtained by leasing radio communication facilities from the Telephone Company. Because radio communication service for the general public is a large undertaking, groups of technically trained personnel are on duty 24 hours daily throughout the week and the year. The electric utility industry appreciates the advantage gained from having available a large group of radio operators particularly in an emergency.

In the course of our regular operations we have developed our testing and maintenance facilities to a considerable extent. The investment represented is justified by large and widespread operations. Mobile units are brought into the shop, replaced with units from the shelf, and sent on their way with a minimum of delay. Any difficulties in the mobile equipment can then be cleared at the convenience of the technician and placed on the shelf ready for future maintenance visits. In the field of maintenance of the mobile equipment, most Telephone Companies have a substantial investment in testing instruments.

**Statistics**

You may be interested in some of the statistical information regarding the use of services of the Telephone Company's facilities throughout the United States. Surveys made last September of the power, gas and water utilities using Telephone Company services are given. In these totals there are a few water and gas companies but the power utilities predominate. In the common carrier service there were 574 mobile units then being served by Telephone Companies. Three of the largest are listed here: Central Illinois Light Co. at Springfield, Ill., with 10 mobile units and at Peoria, Ill., with 16; Cincinnati Gas and Electric Co., 28; and Union Electric Co. of St. Louis, Mo., 58.

In the private service there were the following furnished by the Telephone Companies:

| | Customers | Land Stations | Mobile Units |
|---|---|---|---|
| In service | 11 | 12 | 242 |
| Contracted | 15 | 62 | 857 |
| Total | 26 | 74 | 1099 |

The largest of these are as follows:

| | Land Stations | Mobile Units |
|---|---|---|
| Consumers Power of Michigan | 52 | 767 |
| Philadelphia Electric Company | 2 | 95 |
| City of Nashville Electric Power Board | 1 | 30 |
| Public Service Co. of Northern Illinois (CP only) | 6 | 65 |
| Northern States Power Co., Minneapolis, Minn. | 1 | 53 |
| Southwest Central R.E.A., Indiana County, Pa. | 1 | 5 |

These statistics are given to show you the extent of the service as then furnished by Telephone Companies associated with Bell System. It is interesting to note that a number of the R.E.A.

(*Continued on page* 82)

# Mobile Radio Systems Available and Developments in Recent Years

**By F. Budleman**
*Chief Engineer, Link Radio Company*

**A paper presented before the EEI Transmission and Distribution Committee Meeting, Cincinnati, Ohio, February 10, 1949**

MORE than a decade has passed since power utility companies started to use very high frequencies and mobile radio systems. In that period of time we have passed through a major war period with terrific pressure on development and production of mobile radio equipment. Sufficient time has elapsed since the war for any technical advances to be fully absorbed in commercial design. It should be interesting to examine briefly the trends in design and use of radio equipment for power utility companies.

### Frequency Modulation

In 1939, before the use of mobile radio by power companies had become very widespread, the Link Radio Corporation introduced the first Frequency Modulated mobile radio system. The equipment made at that time, which is still in full use today, exhibited characteristics of range and freedom from noise that gave a great impetus to the use of mobile radio to cover large areas and distances such as encountered in State Police, power distribution, and pipeline services. The universal use only of FM for the mobile services today is conclusive proof of its superiority over the older AM system.

I believe it is also significant that in the period since 1939, including the wartime and post-war development periods, no *basic* circuit changes have been found or made in available FM communication equipment. This fact fortunately indicates that, either by luck or good engineering, the principles around which the early FM sets were designed were sound. The principal changes in equipment are due to factors arising from greatly expanded usage in services existing before the war and in new services established since the war.

This expansion has forced the development of radio equipment that will make efficient use of all available channels without excessive interference from other users. It has forced the exploration and development of new radio-frequency bands, notably the 72-76 mc band, the 152-162 mc band and, in the future, the 450-460 mc band.

As the number of stations on the available channels has increased, excessive interference gradually has caused the development of more and more selective receiving equipment. This trend cannot be followed indefinitely or indiscriminately, however, for, as the receiver band width is reduced, receiver and transmitter stability become more important, maintenance cost is liable to increase, and receiver performance in the presence of noise deteriorates. Much of the recent engineering effort has been directed toward minimizing these necessary evils that arise from large-scale use of a restricted number of channels.

In order to permit more convenient installation and servicing on already crowded vehicles, mobile equipment is being made more compact. The trend is definitely toward single unit transmitter-receiver-power supply combinations which, by incorporating all functions on a single chassis, save a great deal of space, initial cost, and installation time and expense. Newly developed miniature tubes and components make possible these savings with improved ruggedness and reliability. In these smaller units the use of vibrator power supplies for both transmitters and receivers is rapidly increasing over the use of dynamotors, again bringing about a reduction in first cost as well as upkeep.

### Remote Control of Land Stations

In land stations, the use of radio repeater or remote radio control circuits is increasing in order to provide greater coverage and greater reliability at lower cost. I refer to the practice of locating the land station of a mobile radio system at a mountain-top location in order to obtain optimum coverage and controlling it by radio rather than by telephone wires.

Years of experience show that over any appreciable distance, radio control provides more reliable and less expensive results. Open wire telephone circuits on mountain-top locations are exposed to the same climatic hazards as power lines and hence are subject to fail at the same time. Being of lighter construction, the telephone line usually fails first, putting the emergency radio system out of service. By the use of auxiliary gasoline generators at the transmitter location and radio control circuits from the dispatching location, continuity of service is excellent.

### Facsimile Equipment

Remote control of land transmitters by radio is one form of fixed or point-to-point service which is now on the threshold of rapid development. The power utility companies have a great need for point-to-point radio facilities for telemetering, supervisory control, pilot relaying, and remote operation of oil circuit breakers as well as voice communication.

Several companies are planning the installation of facsimile equipment to permit the rapid transmission of data sheets, recording meter charts and similar information. In this manner information can be transmitted at the rate of several hundred words a minute without the possibility of error and with a permanent record at the receiving end. Facsimile equipment is available now.

The stumbling-block in the way of point-to-point radio has been the failure of the Federal Communications Commission to furnish economically usable radio channels or to permit such operation in any case that wire circuits could be used, regardless of expense. There is every hope now, that with the proper initiative on the part of the power company users, the Federal Communications Commission will permit the establish-

ment of point-to-point radio circuits for some of the purposes mentioned.

There are, at the present time, numerous bands above 25 mc in which power companies have, or expect to have, assigned frequencies. The bands are 25-50 mc, 72-76 mc, 152-162 mc, 450-460 mc, and about 9 microwave bands above 950 mc. Of these bands, the one between 25 and 50 mc and the one between 152 and 162 mc are highly developed and in widespread use for land-mobile service. In addition, the new band of 450-460 mc is proposed by the Federal Communications Commission essentially for land-mobile use although many of us have argued for some portion of this band to be set aside for point-to-point use.

### FCC Ruling

An important ray of hope for those seriously requiring fixed radio circuits exists in Sub-note [1] Paragraph 2.103 of Amended Part 2 of the Rules and Regulations of the Federal Communications Commission, effective Feb. 1, 1949, which will read as follows:

[1] Fixed stations in services allocated frequencies in column 11 of the table of frequency allocations in non-government bands allocated for the land-mobile services between 25 and 50 Mc, between 152 and 162 Mc, and between 450 and 460 Mc, may use the frequencies in column 10 of the table allocated such services on the condition that no harmful interference will be caused to services operating in accordance with the table of frequency allocations.

This is construed by the Commission, for example, to permit point-to-point operation in the 450-460 mc band until such time as harmful interference be caused to land-mobile operation.

Of particular interest is the possibility of using 450-460 mc. Equipment for this frequency range is available in very simple, conventional and inexpensive forms compared to what can be offered for use on frequencies above 950 mc. In addition the lower (450-460 mc) frequencies provide better propagation over or around obstacles, and greater freedom from the fading noticed on the higher frequencies during atmospheric disturbances.

Since it will be some time before the 450-mc range will be in appreciable use for land-mobile services and since the question of channel assignments and possible interference between land-mobile and point-to-point services can be controlled by your own frequency coordinating groups, I anticipate considerable usage of these frequencies for telemetering, supervisory control, relaying, facsimile and voice communication.

As a matter of record, one power company, located outside the continental United States, has planned its entire system operations, including voice communication, telemetering, supervisory control and pilot relaying to be carried on by radio in the 152-162 mc and 450-460 mc bands.

In addition the Federal Communications Commission has shown a definite inclination to consider the use of the frequencies now assigned in the range of 72-76 mc for point-to-point circuits wherever it can be shown that no interference to television reception will be caused. In the greater part of this country this condition can be satisfactorily met.

Equipment for fixed services in the 72-76 mc band is inexpensive, is readily available and has had more usage in short range point-to-point service than any other radio equipment. During the past war, radio relay equipment operating in that frequency range furnished the main trunk lines of communication and at the present time the great majority of all repeaters associated with the land-mobile services operate on frequencies between 72 and 76 mc.

### Selective Calling

Turning to the rapidly growing land-mobile services let us review some of the interesting variations that have entered the picture during the past few years to supplement the valuable service rendered by mobile radio. One of the more important in utility service has been selective calling.

To the best of my knowledge the first major, and still one of the largest, users of selective calling in mobile service is The Detroit Edison Company. Their pioneering in this field since, I believe, about 1938 has demonstrated how useful this equipment can be to a power company. Briefly the use is as follows: Two-way radio communication between land and mobile stations is very effective as long as there is some one in the mobile unit to talk to, but when a line truck goes out on a job and all the men leave the truck to work, some means is required to notify the personnel if they are urgently needed at the radio in the truck. Selective calling accomplishes this without disturbing other crews similarly occupied. Each mobile unit is equipped with a selector unit using parts similar to those used in the more elemental telephone dial systems. The operator at the land station operates an ordinary telephone dial, dialing a number assigned to the particular vehicle desired. The dialing of the number causes alarm circuits to operate in the one truck in question so as to alert the personnel for a call. In many cases the alarm consists of a short blast on the vehicle's horn every 5 seconds until the call is answered.

In a land-mobile radio system utilizing a number of land stations, it is common practice to have all the land transmitters on one frequency and all the mobile transmitters on a second frequency, in order to permit simultaneous operation of all divisions without the main station transmission interfering with the reception of signals from the mobile units in other divisions. It is usual, in such cases, for each station to have two receivers; one for picking up transmissions from mobile units and one for monitoring the other land stations in order to clear authorized point-to-point traffic. The amount of activity on the main station channel is high and constitutes a considerable annoyance to the operator. The addition of selective calling at each land station allows the land station channel receiver to be kept completely quiet until a call for that particular station is established by means of the dialing system.

The variety of applications of selective calling is endless and is not limited to dialing in the outgoing direction. There are several mobile radio systems in operation today which utilize direct dialing between mobile units and regular dial-telephone subscribers without the intervention of operators or human control of any kind.

### Selective Calling Dial System

One oil company employs a selective calling system with the dials in the cars and the selectors at various land locations. When something happens in an oil field, particularly at night, the mobile unit wants to dial directly the superintendent or drill boss or whoever may be required without disturbing the other officials on the radio system.

Another relatively new radio tool in the power utility service is the pack set or "walkie-talkie." These sets consist of relatively low-power and light-weight portable transmitters and receivers that are capable of communicating with the

(*Continued on page* 93)

# Electrical Power Station Fire Protection

By N. L. Clarine
*Southern California Edison Company*

A paper presented before the Electrical Equipment Committee Meeting, St. Louis, Mo., February 15, 1949

THE installations and the methods of protecting equipment from fire damage on the system of the Southern California Edison Company, discussed here, may be of value as suggestions to other companies facing the same problems. Surveys are made annually to determine the need for fire protection equipment and the type most suited for the hazards. Generally, the factors in the survey are:

1. Probability of fire (need for equipment),
2. Class location of size of hazard (to determine size and type of protective equipment),
3. Economic value of equipment involved (to determine extent of protection),
4. Hazard to other equipment (an adjunct of 3),
5. Continuity of service to system.

### Types of Equipment

By summation of these factors an attempt is made to determine the type of equipment to be recommended and to what extent economy will justify expenditures for new or additional equipment.

Power installations made in recent years, where oil-filled equipment is involved, have been of the outdoor type which greatly reduces the hazard from explosion or from oil fires, although in many of the older installations the equipment is either not suitable for outdoor use or, in the case of congested areas, sufficient outdoor space is not available, making it more economical to provide adequate protection than to relocate.

### Carbon Dioxide System

A majority of the hydro generating units are protected by bottled $CO_2$ systems when the unit is of the closed type. Open units are equipped with water rings. At all major hydro generating plants the high-voltage oil circuit breakers and transformers are located outdoors and are protected by high-pressure water fire lines equipped with 1½-in. rubber-lined hose and fog nozzles. At these stations where small oil-filled equipment of lower voltage is indoors they are protected by numerous hand extinguishers of various types and each station is equipped with either one or two 750-lb portable, low-pressure $CO_2$ transit tanks with a 50-ft hose and nozzle.

At one major hydro power house all of the equipment is located indoors. The fire protection equipment at this location consists of a 4-ton low-pressure $CO_2$ system equipped with hose reels capable of discharging 350 lb of $CO_2$ per minute. These are located on all floors and are supplemented by hand extinguishers of the $CO_2$ and carbon tetrachloride type. There are also water hydrants equipped with hose and fog nozzles.

At all major 220-kv and 66-kv substations the oil-filled equipment is located out of doors and is protected by high-pressure water lines equipped with 1½-in. rubber-lined hose and fog nozzles. All stations have water wells with large storage tanks or are connected to city water mains. A gasoline-driven booster pump capable of supplying at least 500 gallons per minute at 125 lb pressure has been installed at each station. A considerable number of portable extinguishers are installed at these locations. Types used are $CO_2$, 50-lb units, 20- and 40-gallon carbon tetrachloride, and 150-lb dry powder nitrogen expelled units.

### Automatic Systems

At some stations large condensers are located indoors and are protected by fixed, bottled $CO_2$ automatic systems.

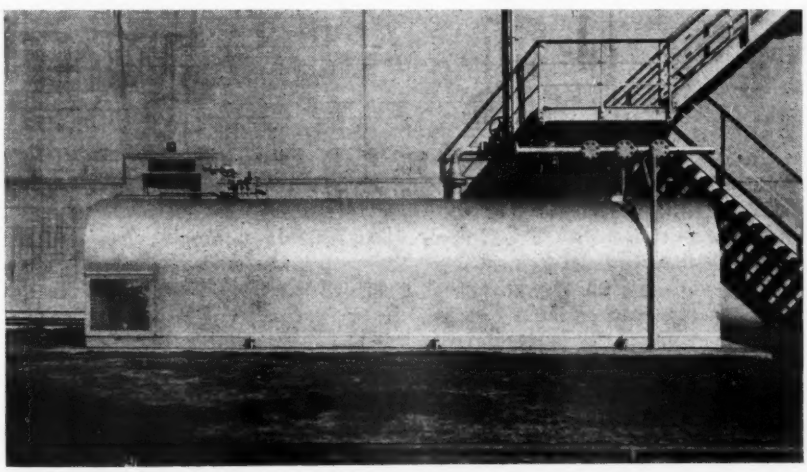


*Fig. 1—Ten Ton Carbon Dioxide System for Steam Plant Protection at the Southern California Edison Co.*

*Fig. 2—Dry Powder Extinguisher for Outside Substation Use.*

Substations of lower voltage, such as 16 kv, 11.5 kv and 4 kv, are generally outdoor installations wherever possible, but in many business and residential areas it becomes necessary to make indoor installations. As these stations are unattended and supervisory controlled, it becomes necessary to use automatic fixed systems for protection. A number of low-pressure $CO_2$ systems have been installed and are usually of one or two ton capacity, thermostatically controlled. These systems are capable of discharging sufficient $CO_2$ to provide a concentration up to 70 per cent within one minute after the discharge is initiated. A one or two shot application can be used if desired, depending on the size of the storage tank. Automatic door and window closures are a part of the system. After a system has been discharged, windows and doors may be opened and with normal ventilation workmen can enter within a few minutes to repair damage; but if the installation is of the basement or underground type, provision must be made to pump out the heavy gas. Stations having more than one room or floor with separate hazards can be flooded separately.

#### Interesting Installations

At one steam plant a large amount of high-voltage, oil-filled equipment is located inside concrete buildings, which makes it necessary to provide protection. The principal hazards consist of generators, oil circuit breakers, current transformers, potential transformers and fuel oil rooms. A centrally located 10-ton, low-pressure $CO_2$ system has been installed with separate piping systems extending to each location with an electrical panel and pushbutton control that is initiated by the operator to flood any hazard where a fire may occur in any of the switch or transformer cells. $CO_2$ discharge is automatic to the generators and fuel oil rooms. Hand extinguishers and water hydrants equipped with 1½-in. hose and fog nozzles are located at many locations throughout the plant. Large fuel-oil storage tanks are a part of the plant and are protected by a fixed foam generating system, using dry powder and water.

Our other steam plant has less hazards than the first plant as most of the equipment is located out of doors. A 4-ton, low-pressure $CO_2$ system has been installed to provide protection for oil lines, boilers, lubricating oil room and transformer oil room within the plant. Six hose reels and nozzles, capable of discharging 750 lb of $CO_2$ per minute each, have been installed on the first and second floors. The protection to the oil rooms is automatic, thermostatically controlled. Water hydrants with 1½-in. hose and fog nozzles have been installed at various locations in the plant. Also, many hand extinguishers are available. Two 1500-gpm electric-driven water pumps are connected to the water lines to provide high pressure. Two large oil storage tanks are protected by a liquid aero-foam fixed system with generators and a storage tank holding 1500 gallons of liquid foam.

The Fire Prevention Committee of the Southern California Edison Company has witnessed a number of demonstrations of different types of fire extinguishing agencies and feel that $CO_2$ has many advantages for indoor use on Class B or C fires. It may be used on oil and electrical fires while the equipment is energized without hazard to the employee or damage to the equipment and without any cleanup necessary after the fire is extinguished.

It is necessary at times to use water where cooling effect is necessary, although damage may be expected from the water, making it necessary to dry out the equipment and conduits containing control circuits. It is also considered hazardous to use water adjacent to energized high-voltage equipment.

Carbon tetrachloride is used for deep-seated insulation fires indoors, but great care should be exercised to avoid the toxic effect from the fumes during the application or from the gas after it contacts the flames. The heavy black smoke that arises from the flames when the liquid is applied greatly hinders the fire-fighting work.

Dry powder, gas expelled, is used extensively for gas and oil fires in open areas where greater projection range is needed, and also in underground vaults where toxic gases and fumes are hazardous to the worker.

The Southern California Edison Company serves an area in which approximately eighty cities, ten counties and a considerable amount of U. S. forest area are located. Constant contact is maintained with city, county, state and U. S. Forestry fire protection agencies at all times. Many interconnections are maintained between the fire protection agencies' communication system and the private system of the Company to provide fast action whether it be for Company equipment protection or to aid them by de-energizing high voltage equipment or lines to protect the lives or property of the public. Many water hydrants are maintained in the rural areas for their use in filling tank trucks and pumpers.

Employees of the various agencies are invited to accompany the Company group on inspection of plants and stations so they may be familiar with the layout and that we may benefit from their experience and suggestions. They are also included in any training meetings or when new fire protection equipment is tested.

Training of personnel is carried on at all times by fire drills at larger stations and meetings held at intervals where fires are started. The personnel are instructed and actually use the equipment to extinguish the fire. All employees involved are instructed in the operation of the fixed systems in hydro stations, steam plants and substations and are present when demonstrations and tests are made.

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## Ebasco Sponsors Safety Seminar

(*Continued from page* 72)

American Society of Safety Engineers and the National Safety Council, outlined the work of their respective associations in the field of safety and answered questions of the seminar group. Members of the panel included W. F. Brown, Safety Director, Consolidated Edison Co.; A. Gordon King of American Gas Association; G. R. King, Philadelphia Electric Co.; Stephen Carter, American Transit Association; W. R. Smith, Safety Director, Public Service Electric & Gas Co. of New Jersey; John S. Cuthbert, National Safety Council, and W. T. Rogers of Ebasco, as Chairman.

The courses at the University were under the auspices of the Department of General Education and were conducted by Dr. Herbert J. Stack, Professor of Education and Director of the Center for Safety Education, and his assistant, Dr. Walter A. Cutter, Assistant Professor of Industrial Safety.

# Factory Built Substations

By W. M. Hanna

*Consolidated Gas Electric Light and Power Co. of Baltimore*

A paper presented before the Joint Session of the Electrical Equipment and Transmission and Distribution Committees, EEI, Chicago, Ill., May 3, 1948.

IT IS the purpose of this paper to discuss the types of factory-designed and built substations and their principal components which are available and how they fit into the economic and physical picture of present-day distribution systems.

Aside from the natural desire of a manufacturer to sew up an entire order in one bite there are real advantages to the industry as a whole to be derived from factory assembly. The main element which produces this advantage is the benefits derivable directly or indirectly from standardization. A single utility company can by standardization of design reap substantial advantages and these increase as the base is broadened and a standard becomes more general.

Each part which can be standardized for use in a variety of ways means less engineering and drafting. Each grouping of parts in a standard combination means further savings. Each complete substation standardized for a variety of services and locations extends such savings still further.

### Saves Manhours

Similarly a construction force habituated to the use of standard parts, groups or entire substations has less waste motion and can develop techniques which will save many manhours. The storekeeper will appreciate the reduction of stock items also.

After the substations are built they must be operated. Consider the plight of the operator, especially the relief and travelling operators who must study each substation and determine a different course of action for each location. It is essential that unattended substations be operated in emergencies by the nearest man who can be reached by radio or telephone whether he be an operator, troubleman or lineman. The greater the degree of standardization the more quickly, reliably and especially more safely can this be done. Carry this far enough and even the office boy can be trained to do the right thing. The result is more rapid restoration of service creating customer good will, a reduction of errors and accidents, and a higher employee morale.

Standardization by a single company is seen to produce many advantages but these can be extended by broadening the base, that is, by providing standards which can be used by many utilities. This can be done best in the factory. Factory-designed equipment which achieves a broad acceptance permits of a high volume of production, thus providing a reduction in cost. This reduction is not just a theoretical or paper savings as is evidenced by the material reduction in the last ten years in the ratio of cost of substations using factory designs and assembled major components and those completely assembled in the field.

A great impetus was given to this program during the war when large volumes of equipment were purchased by single agencies. Cost reductions were real and of considerable magnitude. It is obviously impossible to maintain the degree of standardization which was achieved during the war but a lesson was learned and the industry will continue to profit by it.

The very nature of the equipment which is best suited for factory fabrication and assembly provides a higher degree of safety to the operators. Live equipment is, insofar as is possible, enclosed and out of reach of accidental contact. Interlocks and other safeguards are provided to reduce the probability of errors in operation.

### Stability of Employment

Because a maximum of necessary equipment is assembled in the factory in one transportable unit the cost of installation and removal is materially reduced thus increasing the net salvage when it becomes necessary to replace or abandon any major part or the whole of a substation.

One intangible but very important advantage accruing from the use of factory-designed and assembled equipment lies in that nebulous field of labor relations. One aim of management should be to provide for stability of employment, for a stable organization is a more satisfied and loyal organization. A growing company should have an expanding organization but the rate of growth of the latter should not exceed the rate of growth of the load which makes expansion necessary. Unfortunately this is not practically realizable and often there are wide fluctuations in the labor, drafting and engineering forces following fluctuations in the business cycle. The more work in design and assembly that is done outside of the utility organization in periods of high growth rates the less will be the fluctuations in the magnitude of the force required. A major attack on this problem has been the use of contracting organizations. While this will continue to be necessary it usually results in higher costs, and it is never certain how safe it is to allow outsiders to work around live equipment. The use of factory designs and fabrications, while not a cure-all, will very materially reduce the fluctuations in force and at the same time keep the cost down.

### Standard Designs

The value of a manufacturer's program for the design and manufacture of a standard substation depends largely on the method of approaching the problem. He cannot design a single type of substation fitting a single type of distribution system and say, "Here it is, boys, if it doesn't fit you'll have to change your system." As a matter of fact that is very nearly what was done, and the system the new product would fit, while a good one, didn't even exist.

Certainly one standard design would have its advantages but even if this ideal were realizable in time it could not find immediate acceptance. The initial problem, then, is to design and produce as few standard assemblies as will practically fit as many different conditions as possible and then provide designs of substations using these component assemblies most effectively to satisfy the requirements as found in the field. By gradual education and evolution it should be possible to reduce the number of designs

and approach, if not attain, the ideal of a single type.

Standard component assemblies to be joined into complete substations are available as follows:

- Transformers of various standard sizes.
  - With or without load tap changers
  - Cable connections or bushings on the high side
  - Throat connections on the low side
- Control and metering compartment to connect to transformer throat and to breaker compartments.
- Low-voltage circuit breaker compartments.
  - Breaker tapped to bus
  - Breaker in the bus
- Auxiliary bus compartments.
- Reactor compartments.
- Regulators for both three-phase and single-phase control.
- Standard steel columns and trusses which can be assembled for mounting various high-voltage equipment.
- Metal-clad circuit breakers for high-voltage side up to 34.5 kv in various arrangements.

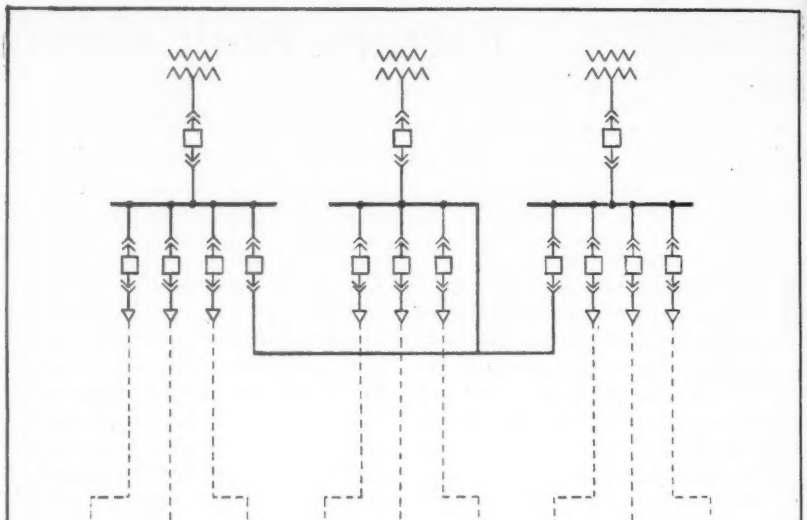


*Fig. 1—Bus Type Substation*

### Urban and Rural Service

In the discussion of the application of the substation elements, a division into two general types of service requirements will be made, namely, urban service and rural service. In urban territories the load density is usually high and exposure of both subtransmission and distribution circuits is relatively low. Therefore, it is possible and desirable to furnish a high level of service continuity. Substations of this class then should provide transformer capacity sufficient to provide service continuity with the loss of any one unit.

Rural service usually implies a widespread territory with considerable line exposure and therefore an equally high level of service continuity is not practical. This being true it seems unnecessary to provide substation equipment to maintain a service level which is not otherwise practical to maintain. Usually, therefore, such a substation contains only one transformer and on its failure service is restored after a greater time interval by transfers of load to adjacent substations or by replacement of the transformer, preferably by a mobile substation.

Fig. 1 is a one-line diagram of the low-tension side of a substation design which has been used to a considerable extent in the past and can be designed with the standard assemblies. This has about everything possible except a double main bus which could be included at considerable expense and is usually omitted. It is suitable for every type of distribution system in use today although it is certainly not recommended for a network.

This substation can be designed with any number and size of transformers, with or without bus-tie circuit breakers and with or without feeder reactors as short-circuit currents dictate. Regulators may be provided with single-phase control if the length of the feeders require it or three-phase control if distribution conditions permit.

### Bus Regulation

If the territory served by the substation is small, bus regulation can be used, either in the form of a regulator in the transformer circuits or tap changers in the transformers. The importance of the auxiliary bus is reduced as only the circuit breaker remains to be cleared by using the spare feeder and auxiliary bus for maintenance or emergency service restoration. This item of equipment can be maintained with only a short outage to rack in a replacement.

### Radial Grid Distribution

If the distribution system is of the radial grid type, that is, if ties are provided between feeders, the auxiliary bus may be eliminated at the expense of an increase in time to restore service after feeder equipment failures and an increase in maintenance costs.

The feeder circuit breakers may be equipped with any standard relaying, metering and reclosing equipment, as required by the characteristics of the distribution system. It has not yet been possible to include relaying to distinguish between fault current and load current when the electrical characteristics of the two are similar. That is, it has not been within the province of the substation designer to include complete protection for all types of faults in all types of dis-

tribution systems but rather to coordinate the substation protective equipment with that used in the various parts of the distribution circuits.

Standard forms of transformer and bus relaying and metering can be included as required.

Another type of substation design is available for radial distribution systems which removes the disadvantages accrued with the elimination of the auxiliary bus in the design previously discussed. Fig. 2 is a one-line diagram of the duplex equipment and some variations which are possible within the general scheme.

In the basic scheme one transformer, provided with automatic tap changers is used for each feeder. The tie circuit breaker is operated normally open but closes automatically on loss of one transformer or the supply to it. In this design any major element of the substation can be removed if it is in trouble or for normal maintenance without any interruption to service. Thus, without an auxiliary bus this substation does not require any outside switching to permit work on substation equipment.

Depending on the conditions in the particular area involved, these substations can be small and spaced throughout the area or large and centrally located. If one or more of the feeders is so long that unbalance between phases becomes too great to permit the use of three-phase regulation, single-phase regulators can be used in any feeder. This regulator can be equipped with a by-pass switch to permit maintenance or can rely on ties in the distribution system to shift load and permit an outage. With a less desirable physical arrangement the regulator can be placed between the transformer and its circuit breaker and thus permit work in the substation without outside assistance.

Variations can be made in the duplex arrangement with two or more feeders per transformer. As the number of feeders per transformer is increased it becomes more difficult to balance the feeder loads and lengths so that regulation from the transformer taps is satisfactory and it becomes more probable that additional regulators will become necessary. If required there is a choice of location as in the straight duplex. That is, a regulator can be installed in the feeder with or without a by-pass switch or between the transformer and the feeder breaker. In the latter location the regulator must carry the load of two feeders in an emergency.

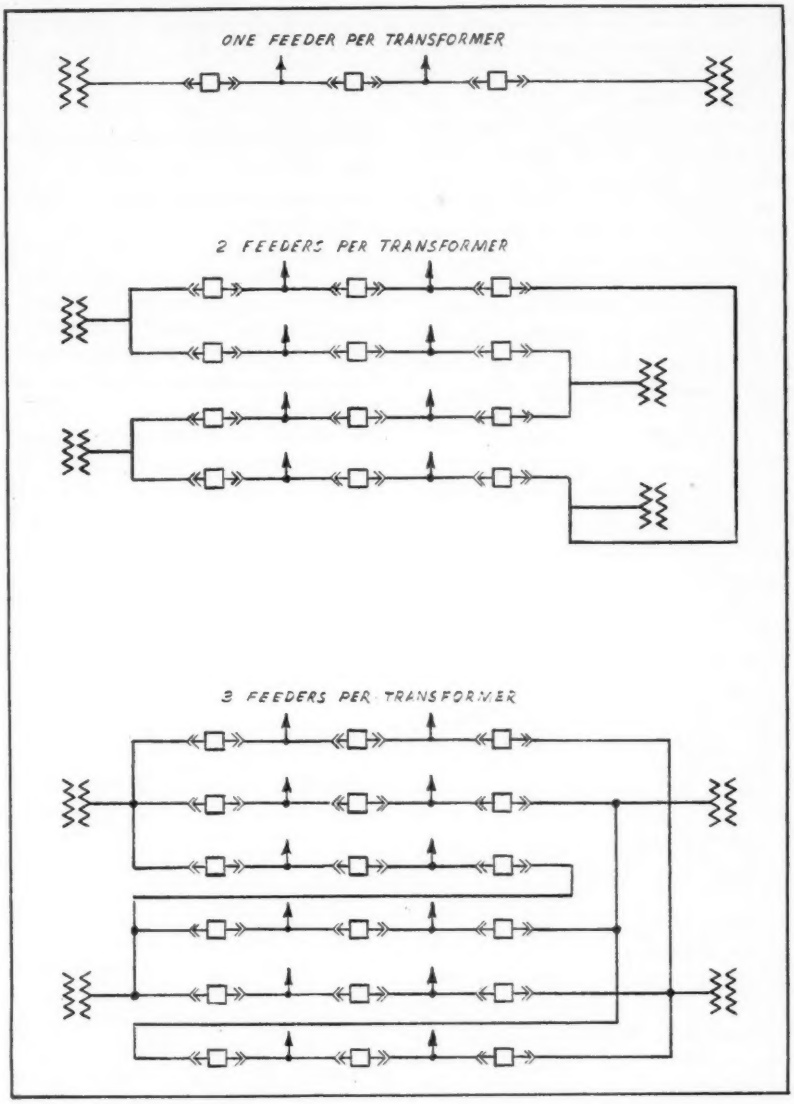



*Fig. 2—Duplex Type Substation and Variations*

As in the case of the bus-type substation a variety of standard relay, metering and reclosing equipment is available for the duplex and its variations.

Within a relatively short time a new type of distribution system for urban territories has been introduced and found considerable favor, namely the primary network. This type of system requires a single transformer and a breaker for each network tie as shown in Fig. 3. Any piece of station equipment and the entire substation can be removed from service in case of trouble or for maintenance as the entire load will be automatically picked up on adjacent substations. As the voltage is supported at

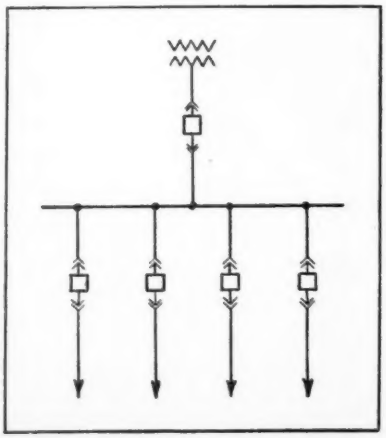


*Fig. 3—Network Type Substation*

both ends of all mains it is unlikely that the tap changer will prove inadequate in maintaining satisfactory voltage.

A modification of this system, which is less expensive but causes outages over a greater area during feeder trouble, consists of substations having a single circuit breaker at each substation and a circuit breaker or fuse in the network ties between substations.

The relaying, metering and control can be of several standard combinations but the transformer relaying must include reverse power trip due to the feedback from other supply points.

### Supply Circuit Costs

The high-tension side of the urban substations can vary over a wide range and be made to fit multiple feed whether cable or overhead and various types of sectionalized loop supplies. Standard designs are made for voltages up through 69 kv. In the case of cable supply it will usually be the case that the cost of the supply circuit is high as compared to the incremental cost of substation capacity. In this case no element of the substation should limit the load below that which the supply can carry. If the supply is overhead the economy may be the other way, in which case, size of the substation elements should depend entirely on the characteristics of the distribution system.

Rural substations almost invariably will consist of only one transformer and as many feeders as are required. The one-line diagram is similar to that of the primary network substation except that the transformer circuit breaker is usually omitted. If, as is frequently the case, only one feeder is installed for each substation, a different type of equipment can be used, which was not included in the list of component assemblies. This is a unit containing transformer, control and feeder equipment all in one box to reduce the labor of installation to a minimum.

The high-tension equipment can be assembled of standard parts to fit nearly every type of subtransmission system now in use from a single radial circuit to an automatically sectionalized loop or double feed with throwover equipment.

To summarize, there are produced a number of standard assemblies and parts which can be used in the design of substations to serve a wide variety of conditions both as to supply and distribution. Designs are, or can be made, available for this wide variety. This has been and is necessary in order to meet the wide variety of conditions met with in the field. Many of these conditions are brought about by geographical or other considerations which cannot be changed. Others are caused by individual methods used in meeting similar problems and these can be gradually changed if it proves economical.

One element of the economy is the design of the substation. A reduction in the number of designs produced will ultimately redound to the advantage of the users. No attempt is made to intimate that the substation is, or should be, the controlling factor in a distribution system but merely to state that any degree of standardization and simplification which can be achieved is a step in the right direction.

### Standardized Component Assemblies

More important from the standpoint of production than the standardization or overall designs is the standardization of the component assemblies. As long as the details of these assemblies are varied for each purchaser it is impossible to achieve the maximum of savings through modern production methods. When a certain degree of standardization has been achieved it will prove more economical to produce assemblies of one general kind as absolute duplicates and make any alterations or replacements to take care of individual specifications after production is complete.

It is desirable, therefore, that specifications be written to cover exactly the equipment which has been selected as best meeting the majority of the needs of the industry if this is at all possible. This standardization should not be carried to the point of excluding new developments which are of value to the industry. Production techniques must be kept sufficiently flexible to permit periodic changes as improvements become available.

### Reclosing Fuses

Having stressed the need for greater standardization both of overall design and detail it now seems desirable to make an about face and point out a substation design that is not produced by any manufacturer today. The use of reclosing fuses has proved satisfactory for use in many rural and some urban type substations. As this type of equipment represents a considerable savings over circuit breakers it is felt that the manufacturers should include such designs if they wish to have a line that is completely acceptable to the industry. It is also suggested that the manufacturers stabilize their designs dimensionally so that the user may be sure of obtaining a fit when it becomes necessary to expand a substation. And further, that the different manufacturers standardize the connection dimensions so that in an emergency an assembly made by one may be used with assemblies made by another.

## Telephone Company Mobile Radiotelephone For Power Utility Use

(*Continued from page* 74)

services also use the common carrier for their radio units. The totals are somewhat larger now, but are not available in detail.

It is believed that telephone companies can offer important advantages in providing radiotelephone services to power utilities. Specialists in communication, the telephone companies operate large numbers of radio circuits and have available a force of trained technicians. This results in economies of operation and maintenance that are reflected in the rates. Engineering services are also available and the power utility is relieved of the responsibility of supervising the installation.

The allocation of frequencies is essential to radio communication facilities, and the recent hearings before the Federal Communications Commission emphasized the shortage of frequencies. It has been a general practice to seek frequencies on a nationwide basis by industries, and if this practice is continued there may come a day (if it is not already here) when frequencies can be had only by taking them away from other services. The common carrier system features the most efficient use of the available frequencies and offers the maximum possible usage to the maximum number of users.

Telephone engineering practices developed during the growth of the general telephone network are being applied to the radiotelephone extensions. The same advantages that you now obtain from your regular telephone facilities can be expected of your radiotelephone services when obtained from the Telephone Company.

# EEI Resuscitation Medals Presented For Courageous and Humane Actions

**By Mae B. Woods**
*Secretary, Committee of Judges, Edison Electric Institute Medal*

TO ROUND out the annual review of Edison Medal awards, which this year included an unprecedented total of 35 presentations, brief descriptions of the events leading up to 20 of these awards are offered below. Last month's BULLETIN carried short accounts of 15 of the resuscitations which earned this highly regarded honor.

The Edison Electric Institute Medal for Resuscitation, to give the award its full title, was authorized in 1933 with a dual purpose in view—to provide recognition for courageous and humane action in saving a fellow-worker's life, and to inspire and maintain the interest of electric company personnel in the prone-pressure method of artificial respiration which had proven so indispensable in preserving precious lives.

### Medal Extended to Pole-Top Resuscitation

It was decided later to extend the medal also to those who had performed resuscitations by the comparatively new pole-top method, an especially valuable technique, since it made possible the application of artificial respiration within a matter of seconds following an electrical shock, without making it necessary for the rescuer to bring the victim down to a level surface.

As pointed out in the BULLETIN last month, employees of all electric light and power companies are eligible for the award. With the presentation of each medal, a certificate citing the resuscitation and signed by the President of the Institute is also awarded. Recognition of valuable aid given by others besides the medal winner is given with the bestowal of certificates of assistance. In some instances, when an entire line crew has been awarded the medal, miniature medals and certificates are presented to each member.

To conclude this year's review of the Edison Medal awards, brief descriptions of the circumstances and actions recognized in 20 of the presentations follow:

### CECIL P. WALKER

*Florida Power Corporation*
St. Petersburg, Florida

Lightning had blown out the primary fuse and torn down the middle phase wire of an 8000-volt line in Davenport, Fla., on August 30, 1947. Electric servicemen Henry N. Jaeger and Cecil P. Walker located the trouble in the late afternoon and began repairing the line. Jaeger climbed the 40-ft. pole and opened all three cutouts on the south side of the double arm with an 8-ft. hotstick, then moved to the north side to splice the middle phase wire and dead-end it on the dead-end insulator, leaving enough wire for a jumper to the bottom of the cutout on the south side of the double arm.

Moving to the south side of the pole, Jaeger proceeded to put the jumper in the receptacle on the right-hand side of the jack. Inadvertently his movement was such that his forehead touched the top of the energized cutout.

When the contact was made, Jaeger's knees buckled and his hooks cut out. He slipped a few feet down the pole feet first, turned over and fell sideways, his safety belt causing him to fall into the pole. He hit the ground on his head and right shoulder. Walker ran over to find Jaeger unconscious, not breathing, his face blue. He unbuckled the safety belt and loosened the body belt before giving artificial respiration by the prone-pressure method. After five or six strokes, Jaeger began to move and breathe. Within one minute after the shock, he was breathing without assistance, but was still unconscious. He was taken in the company service truck to a doctor's office where he was treated for minor scratches and burns, and soon regained consciousness.

Cecil P. Walker received the Edison Medal and certificate at a Labor Day ceremony in Lake Wales, Fla., on September 6, 1948. Vice President J. F. Bailey, of the Florida Power Corp., made the presentation before hundreds of Walker's fellow employees and their families. The *Lake Wales News*, *Haines City Herald* and *Sunday Highlander* carried accounts of the ceremony.

### GEORGE FOSTER

*Central Illinois Light Company*
Sycamore, Illinois

At a street corner in Sycamore, Ill., on June 13, 1947, Lineman Glenn Sweeney was working on a pole carrying a 4000-v, 3-phase, 4-wire primary, secondary and street light circuits, and a 25-kva transformer. A head guy steadied the pole and was in contact with the primary ground wire. All conductors on the pole were covered with rubber protective equipment except a jumper on which Sweeney was placing a connector. With insufficient clearance around him, Sweeney could not shift his position to tighten the connector, and when he moved his right arm he touched the jumper with his

CECIL P. WALKER (left), who received the Edison Medal for a successful resuscitation, is congratulated by the lineman whose life he saved, Henry N. Jaeger, (right).

GEORGE FOSTER (left), accepts the award of the Edison Medal presented by H. G. Kniese, Director of Industrial Relations, Central Illinois Light Co., the first award received by that company.

Rex I. Brown (right), President of Mississippi Power & Light Co., presents the Edison Medal to JEWEL A. KNIGHT (center), and a Certificate of Assistance to T. P. GATLIN (left).

forearm above the rubber glove. The current passed through Sweeney's body from right forearm to left foot, which was in contact with the grounded head guy.

George Foster, lineman on the crew making the repairs, started up the pole at once and cleared Sweeney's foot from the guy, letting him fall back unconscious on his safety belt. Foster began pole-top resuscitation immediately. In one minute Sweeney was breathing without assistance. A doctor, arriving as Sweeney was lowered to the ground, examined him and took him immediately to a hospital where he was treated for burns and acute electrical shock.

"I'm proud to win this award," George Foster said when he was presented the Edison Medal and Certificate at a banquet in DeKalb, Ill., on May 13, 1948. H. G. Kniese, director of industrial relations, Central Illinois Light Co., presented the Medal, which was the first ever received by an employee of that company. The *DeKalb Chronicle* of April 14, 1948, carried an account of the banquet which was attended by 61 of Foster's fellow employees.

## JEWEL A. KNIGHT

*Mississippi Power & Light Company*
McComb, Mississippi

On October 13, 1947, the Southern Division Safety Committee of the Mississippi Power & Light Co., was holding a meeting in the McComb, Miss., office. At 10:25 a.m. the power went off and came back on again. Immediately afterward a telephone call reported the injury of two workers at a plant of the Southern United Ice Co.

All members of the Safety Committee went to the scene of the accident where they found workers Walter James and Eugene Hicks unconscious from electric shock received while putting a new roof on the ice plant. Hicks was being put into an ambulance, James was lying on the ground.

H. B. McGehee and Clint Hester removed Hicks from the ambulance and Jewel Knight, combination local manager of the power company, at once began artificial respiration by the prone-pressure method. Melvin Flowers attempted to resuscitate James. After a few minutes, Knight was relieved by T. P. Gatlin. Clint Hester stood by and, when Hicks began to breathe, went to the aid of Flowers who was giving artificial respiration to James. Hicks began to breathe freely after about 20 minutes of artificial respiration. When he had regained consciousness and been given first aid for burns he was taken in an ambulance to a McComb hospital where he was treated for severe burns on the right hand, left arm, left foot, chest and back.

Flowers, Hester, McGehee, Gatlin and others worked on James but he never regained consciousness.

Subsequent investigation revealed that Hicks and James had been filling buckets with pea gravel to be hoisted by a hand-powered winch and a steel cable to the top of the building. In the act of lowering the bucket, the cable slipped off the winch on the roof and touched one phase of a 13-kv line running alongside the building. Both men had been in contact with the cable at the time and had received shocks. W. F. Brown, an automobile mechanic, cleared them from the circuit by removing the steel cable from contact using a 2 by 6-in. board.

At special ceremonies in McComb, Miss., on July 16, 1948, Jewel A. Knight received the Edison Medal and Certificate, and T. P. Gatlin, the Certificate of Assistance. The awards were presented by Rex I. Brown, President of the Mississippi Power & Light Co., before a large gathering of employees. He also presented the Rex I. Brown Gold Medal to Mr. Knight and a Silver Medal to Mr. Gatlin. The accident was fully reported in *The Mississippi Power & Light Co. News*, October, 1947.

## HARRY T. FERGUSON

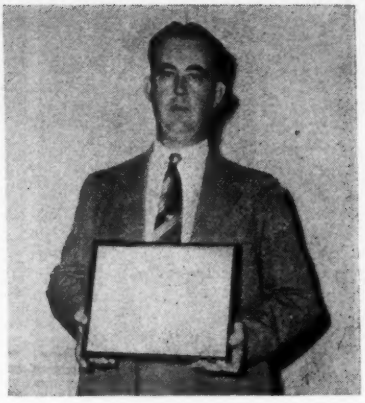
*Florida Power Corporation*
Tarpon Springs, Florida

Induced voltage of unknown value surged along a de-energized 110-kv line paralleling an energized 66-kv, 3-phase line for 50 miles between Inglis and Tarpon Springs Substation, Fla. On the evening of October 30, 1947, Line Crew Foreman O. E. Gause and Harry T. Ferguson, lineman, prepared to ground the 110-kv line in order to conduct relay tests before placing the line in operation. A clearance was obtained for the 110-kv line between Inglis and Tarpon Springs for short circuiting and grounding.

Ferguson climbed the steel tower to a position at the top between the middle and east phases of the 110-kv line, and fastened his safety belt. A grounding device with 6-ft hotstick handles was hauled up to him by block and fall. Gause, meanwhile, climbed to the top of the tower to assist, and, when passing between two large insulators, slipped and grabbed at the insulator to regain his

J. F. Bailey (left), Vice President of Florida Power Corp., presenting the Edison Medal to HARRY T. FERGUSON at a safety meeting in Tarpon Springs Substation, Fla., on July 26, 1948.

Members of the Gulf States Utilities Co. Substation Crew receive the Edison Medal Certificates and replicas of the medal from H. C. Leonard, company vice president. Left to right, they are: Tullie Brady, superintendent of Gulf States' Clinton, La. office, who was resuscitated; R. C. HARRIS; H. C. NORTON; H. J. RIPPLE; M. B. PRICE; J. W. BELLO and Mr. Leonard, who made the presentation at Baton Rouge, La., on August 26, 1948.



H. G. RODGERS, above, another member of the Gulf States Utilities Co. Substation Crew, who was not present at the ceremonies pictured at left, also received the award of the Edison Medal.

balance. His right arm contacted the metal insulator cap and he was frozen in that position by the shock.

Ferguson took the hotstick which was part of the grounding device and tried to pull Gause free of contact. When this failed, with split-second timing, Ferguson struck his arm free with the hotstick, dropped it and reached forward to catch Gause as he fell toward the concrete 40 ft. below. Ferguson immediately applied artificial respiration by the pole-top method while holding Gause in mid-air, and within two minutes Gause was able to breathe freely. Gause proceeded to the ground without assistance and was taken to a doctor's office where he was treated for minor burns.

The Edison Medal and Certificate were presented to Harry T. Ferguson by J. F. Bailey, vice president of Florida Power Corp., at a safety meeting in Tarpon Springs Substation on July 26, 1948. The presentation was reported in the *Tarpon Springs Leader*, July 29, 1948, *The Sun*, Clearwater, Fla., July 27, 1948, and in the company newspaper *Power Lines*, August, 1948.

## GULF STATES UTILITIES CO. SUBSTATION CREW

*Gulf States Utilities Company*
Zachary, Louisiana

Tullie Brady, local superintendent of the Clinton (La.) office, Gulf States Utilities Co., was observing the work of a substation crew at the Zachary (La.) Substation on the afternoon of August 18, 1947. The crew, consisting of Foreman H. J. Ripple, R. C. Harris, M. B. Price, J. W. Bello, H. C. Norton and Harry Hughes, were changing taps on the three substation transformers in order to raise the voltage 5 per cent. The steel, 33-kv to 2.4-kv station has one 100-kva and three 75-kva transformers connected in closed delta and is enclosed by a cyclone fence. Three columns of the substation structure were grounded and on the fourth was mounted the switch handle (also grounded) of the 33-kv group-operated disconnect switch. This switch was closed during the current and voltage testing to determine whether the connections were correct.

Brady, inside the substation yard, had rested his right foot on a cross-member of the substation structure when Foreman Ripple cleared the yard and ordered the three 2.4-kv repeater fuses to be closed, one by one, for the tests. The second repeater fuse to be closed dropped out and began arcing to the steel cross-member on which the repeater fuses were mounted. Harris, using rubber gloves, quickly opened the disconnect switch and then noticed that Brady, lying astride the steel cross-member and against the substation fence, was rigid, unconscious and not breathing.

Ripple and members of the crew removed Brady from the station yard and Harris at once began artificial respiration by the prone-pressure method. Ripple pried Brady's mouth open with a screwdriver and ordered a message radioed to summon an ambulance. H. G. Rogers, district serviceman, who was in Zachary, intercepted the message, rushed to the scene and was immediately sent for a doctor. When he returned with the doctor, Rogers alternated every 8 minutes with Harris in giving artificial respiration. The doctor administered first aid and gave injections of adrenalin and calcium gluconate. After 40 minutes of artificial respiration, Brady revived and breathed without assistance. He was taken in an ambulance to a Baton Rouge hospital where he was treated for 2nd degree burns of the right shoulder and elbow, right calf, left ear and temple.

The Edison Medal was awarded to the entire substation crew and replicas of the medal were received by R. C. Harris, H. G. Rogers, H. J. Ripple, M. B. Price, J. W. Bello, H. C. Norton, Harry Hughes, and W. L. Parker. The presentation was made by H. C. Leonard, vice president of the Gulf States Utilities Co., before 200 company employees at an annual T & D Safety banquet in Baton Rouge on August 26, 1948. An account of the ceremonies was carried in the *Morning Advocate*, Baton Rouge, La., Aug. 27, 1948, and in the company magazine.

## PETER CLEMENT

*Iowa-Illinois Gas and Electric Company*
Rock Island, Illinois

At the top of a pole carrying a 2300-v, single-phase circuit between Rock Island and Milan, Ill., Line Foreman C. S. Ostrander and Apprentice Lineman L. L. Willis were transferring primary conductors from an old pole to a new one 15 ft away. It was approximately 2:50 p.m. on October 24, 1947, when Willis lost his hold on a hot wire which snapped back and struck him in the

PETER CLEMENT (second from right), receives the Edison Medal award from C. P. Conrad, President of Iowa-Illinois Gas and Electric Co., as C. S. OSTRANDER (left) and HENNING THOMSEN (right), who received Certificates of Assistance, look on at the presentation made in Moline, Ill., on Oct. 12, 1948.

O. L. JAMES (second from left), receives the Edison Medal in a presentation made by T. D. Hughston, Safety Engineer, Texas Power & Light Co. Reading left to right: R. S. MacAfee, Distribution Superintendent; Mr. James; Mr. Hughston and J. H. Durning, District Manager.

Reading from left to right at the presentation of the Edison Medal and Certificates of Assistance made by Thomas L. Paden, Superintendent of Operations, Pennsylvania Power Co., are: J. B. COOPER, Certificate of Assistance; CHARLES H. MORT, Edison Medal; Mr. Paden; J. BARNHART and W. R. DONLEY, Certificates of Assistance.

face, shocking him into unconsciousness and causing him to fall back onto his safety belt, from which he hung head down.

Foreman Ostrander, who stood across from Willis on the pole, immediately cleared him from the circuit. Lineman Peter Clement at the same time climbed to a position behind Willis and, within 3 minutes after the accident occurred, began to apply pole-top resuscitation. Ostrander and Henning Thomsen, another crew member, assisted in lowering Willis to the ground as Clement worked on him, and then secured medical aid before the injured was taken to a hospital in Rock Island. Almost 6 minutes later Willis became conscious and was able to breathe without aid.

Peter Clement received the Edison Medal and Certificate on October 12, 1948, at a service awards dinner in Moline, Ill. C. P. Conrad, President of the Iowa-Illinois Gas & Electric Co., made the presentation and also gave Certificates of Assistance to C. S. Ostrander and Henning Thomsen. A report of the meeting and ceremony appeared in *The News-Caster*, the company magazine, for November, 1948.

### O. L. JAMES

*Texas Power & Light Company*
Sherman, Texas

A current transformer and recording ammeter had been installed on a line pole between Sherman and Denison, Texas, to check load on a single-phase, 7200-to-2400 volt stepdown transformer. Crew Foreman O. L. James watched from the ground on the morning of September 10, 1947, as Lineman Roy Pritchett climbed the pole to remove the temporary installation of current transformer and ammeter. Pritchett started to connect his safety belt around the pole, and in so doing brought the left side of his chest into contact with the ammeter case which was energized at 2400 volts to ground through failure of the current transformer.

James called out to Pritchett when he saw the arc and noticed him leaning away from the pole, his safety belt still unbuckled. Pritchett made no reply and slowly fell away from the pole. From 36 ft up he fell to the ground within 10 ft of the butt of the pole, landing on his face and left shoulder. James reached him immediately as he lay face down, and without wasting a moment, began artificial respiration by the prone-pressure method. Claude Anderson, a fellow crew member, went to phone for assistance and then aided the injured by constructing a shelter to protect him from direct rays of the sun. After 3 minutes of artificial respiration, Pritchett began to show signs of life. Twenty minutes later he could breathe without assistance. When a doctor arrived, he immediately ordered the injured man to be taken to a hospital where he could be treated for slight burns, electric shock and internal injuries. Eight days later, Pritchett died at the hospital of internal injuries resulting from the fall.

O. L. James was presented the Edison Medal and Certificate at an annual gathering of company employees in the latter part of July, 1948. Claude Anderson also received a Certificate of Assistance in the presentations made by T. D. Hughston, Safety Engineer, and J. H. Durning, District Manager of the Texas Power and Light Co.

### CHARLES H. MORT

*Pennsylvania Power Company*
New Castle, Pennsylvania

Lightning that damaged the distribution circuit outside the Leesburg (Pa.) substation during an electrical storm on the afternoon of July 22, 1947, caused a bushing failure on one of the 150-kva, 24,000/4800-v transformers in the substation. Foreman Harry W. Slagle, W. R. Donley, J. B. Cooper and C. Mort, electrical mechanics of the substation crew were dispatched to remove the damaged transformer from service and put the station back in service with the other two transformers operating in open delta connection.

Slagle, on arrival, looked over the substation and reported to his crew, "she's all clear," after noting that the 24,000-v air-break switch and 4800-v disconnects were open and outgoing lines de-energized. After the transformer leads had been disconnected and placed in the clear, Slagle climbed up to the fusing platform and replaced the blown "C" fuse which he handed down to Mort on the ground. Mort was moving to the rear of the station when he heard the roar of an arc and looking up, saw Slagle fall onto the fusing platform.

As soon as he heard the sound, Mort went to Slagle and at once began to apply artificial respiration by the prone-pressure method. The injured man was unconscious and not breathing but, after five strokes of

D. C. Duncan, System Safety Director, Appalachian Electric Power Co., presents the Edison Medal to J. R. WATKINS (second from right) as J. L. White, District Manager (right) and I. B. Peters, District Safety Manager (left), look on.

respiration began to move and a short time later could breathe without assistance. Cooper, Donley and electric serviceman John Barnhart assisted in lowering Slagle from the platform to the ground outside the substation and then summoned an ambulance. At the hospital in New Castle, Slagle was treated for 3rd degree burns of both arms to the shoulder, soles of both feet and numerous 2nd degree burns of the shoulder, back, chest and feet. Death followed 25 hours later as the result of the severe electrical burns.

When returning the substation to service after the accident, it was noticed that "C" phase was arcing over and that burn marks on the structure indicated that Slagle had climbed above the fusing platform and come in contact with a 24,000-v lead-in to the lightning arrester.

Charles H. Mort received the Edison Medal and Certificate, and J. B. Cooper, W. R. Donley and John Barnhart, Certificates of Assistance which were presented by Thomas L. Paden, Supt. of Operations of the Pennsylvania Power Company.

Ray Edson (left), Assistant Manager at Tyler, Texas, for the Texas Power & Light Co., presents the Edison Medal to his son, ROBERT K. EDSON, who received the medal for saving the life of Lineman J. E. Parnell (second from right) at ceremonies in Tyler, Tex., on Dec. 17, 1948, attended by T. D. Hughston, Field Safety Engineer (right).

## JAMES R. WATKINS

*Appalachian Electric Power Company*
Roanoke, Virginia

Foreman W. C. Carper had just warned his crew that they were working on "hot stuff" as they were installing a 2300-v, single-phase, grounded rural line approximately 5 miles north of Roanoke on December 22, 1947. Linemen J. R. Watkins and J. W. Peery had installed a transformer and secondaries while a hot primary wire nearby was covered with rubber line hose. Neither man had on rubber gloves. When all connections were made except for the primary tap, Peery put on his right-hand rubber glove *only*, to attach the hot line clamp. Using his leather-gloved left hand to steady the clamp, Peery contacted the primary wire. Current at 2300 volts passed through his body from index finger, left hand to right foot, shocking him into unconsciousness.

After an unsuccessful attempt to free Peery's hand with a hammer, Watkins put on rubber gloves, cut the primaries and de-energized the line. Peery then fell head down against the pole, held by his safety belt. Watkins wrapped his arms about Peery's waist and began to apply pole-top resuscitation. It was two or three minutes before he regained consciousness and could breathe again without assistance. With a handline attached to his belt, Peery descended the pole and received first aid on the ground while awaiting a doctor and ambulance. He was treated at a Roanoke hospital for 3rd degree burns of left index finger and sole of right foot.

The Edison Medal and Certificate were were presented to J. R. Watkins by D. C. Duncan, system safety director, Appalachian Electric Power Co., at an employee meeting in Roanoke, Va., on October 7, 1948.

## ROBERT K. EDSON

*Texas Power & Light Company*
Tyler, Texas

An eight-man line crew in Tyler, Texas, had already completed the transfer of a 7.2-kv primary and 2-wire secondary from an existing 30-ft pole 4 ft across to a new 45-ft pole using temporary jumpers from a 3-kva transformer on the old pole to the primary and secondary. On the morning of March 24, 1948, the crew foreman instructed a first-class lineman to "go back to this job, open the temporary 7200-volt jumpers and start dismantling the 30-ft pole," and that he, the crew foreman, "was going by the store room to pick up some additional material and would be out on the job a little later."

At the job, the lineman acting as crew foreman said he would lift the hot tap on the 45-ft pole which would kill out everything on the 30-ft pole before beginning to dismantle it. He proceeded to climb the 45-ft pole, open the primary cutout on the 30-ft pole, killing the transformer and secondary and moved up the pole to open the hot tap on the primary. At the same time, lineman J. E. Parnell, acting without instructions, climbed the 30-ft pole saying, "I'll go on up a little way and be ready when he kills it out." Parnell, even with warnings from the ground, climbed to the crossarm level on the 30-ft pole and then put his right arm over the crossarm and around the back of the pole. His right arm came in contact with the top jaw of the primary cutout; his right foot was in contact with the pole ground and his left foot with the meter conduit. After the shock, he fell clear, dropping 14 ft to the ground.

Ground man R. K. Edson immediately began artificial respiration by the prone-pressure method. After about 4 minutes, Parnell showed signs of life and within 20 minutes of losing consciousness he could breathe without assistance. When the summoned ambulance arrived, Parnell was taken to a hospital where he was treated for 3rd degree burns of the right arm and both feet.

Robert Kirk Edson received the Edison Medal and Certificate at a presentation made by his father, Ray Edson, assistant manager at Tyler, for the Texas Power & Light Co. A large gathering of employees witnessed the presentation at an annual Christmas dinner held on December 17, 1948.

Edson was also presented the John W. Carpenter Medal awarded by the Texas Power & Light Co. at the same ceremony.

Lineman O. W. ROSENBERG (center), receives the Edison Medal at ceremonies in Red Wing, Wisc., on Sept. 21, 1948, attended by (left to right): A. E. Freeberg, District Manager; W. H. Brown, Safety Director; Mr. Rosenberg; M. B. Monsen; C. A. Dow, Assistant Safety Director and O. Bostrom, the lineman who was resuscitated.

## OSCAR W. ROSENBERG

*Mountain States Power Company*
Wisconsin

While replacing a section of old poles carrying 6900 volts along U. S. Highway

PAT MCDONNELL (right), Montana Power Co. lineman to whom the Edison Medal was given in recognition of a successful resuscitation; and the recipients of Certificates of Assistance (left to right): E. FISHER; E. H. GRAY; W. ELFORD and Mrs. Mattson (widow of FRANK MATTSON).

No. 10 east of Grange Hall, Wisc., during the afternoon of July 18, 1947, a line crew, supervised by Foreman Vernon H. Erickson, began to pull one of the old poles from the ground. The 6900-volt wires had been transferred from the old pole to the new line some 7 ft south, but the old pole still had a bare copper ground wire stapled to it.

As the pole was being pulled slowly out of the ground by the winch, Oscar Bostrom, a lineman of fifteen years' experience, watched the pole butt. Suddenly the pole jerked. Since neither the third leg of the "A" frame, nor the truck jacks at the rear were braced on the ground, the front wheels of the truck had very little weight on them. The front wheels of the truck began to slide northward. This in turn swung the "A" frame south, and the pole, its butt not yet clear of the ground, swayed toward the 6900-volt line. In an effort to keep the pole from hitting the phase wire, Lineman Bostrom caught the pole, but he was unable to stop it. The pole ground wire came in contact with the phase wire while Bostrom had his hands on the pole, and he was knocked down and rendered unconscious by the shock.

Lineman O. W. Rosenberg was standing directly behind Bostrom and immediately pushed him off the pole. Rosenberg himself was knocked down in this contact, but he quickly straightened Bostrom out on the ground, and applied artificial respiration. After less than a minute, Bostrom began breathing. He was kept quiet and in a prone position until his color returned, and then taken to the hospital. He returned to work on the afternoon of the next day.

The Edison Medal was awarded to Rosenberg at a meeting of Northern States employees at Red Wing, Wisconsin, on September 21, 1948.

### PAT McDONNELL

*The Montana Power Company*
Butte, Montana

Patrick Sheehan began his first day as apprentice lineman on April 30, 1945, stringing a new iron telephone wire between Ruby and Laurin, Mont. The new line was being strung on a crossarm below two crossarms supporting three phases of a 50,000-v transmission line. A half-mile of the new line, pulled over the crossarms of six poles, had emptied the reel before the end was tagged. The other free end was attached to the rear bumper of a pick-up truck and was pulled across the intersection of the main highway to Sheridan. Sheehan and Foreman John Perrick took hold of the wire behind the truck to move it in line for the next pole. At this point the tag line at the other end of the wire hung up on a crossarm and the sag between two poles caught under a buffalo berry bush. When the line released itself under tension exerted by the truck, the wire whipped up and contacted the lower phase wire of the high line. Both men took the full shock of 29,000 volts to ground. Perrick rolled clear of the wire badly burnt but still conscious; Sheehan, however fell forward across the wire which was still gripped in his hands.

Linemen Pat McDonnell and E. H. Gray ran to assist the stricken men. McDonnell immediately began artificial respiration by the prone-pressure method as soon as the circuit was opened by relays and Sheehan could be freed. Truckdriver W. Elford helped McDonnell apply artificial respiration before driving to Sheridan to call for a doctor and ambulance. Within 5 minutes Sheehan showed signs of life and 15 minutes later could breathe unassisted. The doctor dressed burns on hand, arms, feet and legs of both injured men and administered hypodermics of coramine and morphine to Sheehan, prior to the arrival of the ambulance which took them to a hospital in Butte, 75 miles away.

At the company auditorium in Butte on October 29, 1948, a large number of fellow employees witnessed the presentation of the Edison Medal and Certificate to Pat McDonnell made by M. E. Buck, vice president and general superintendent of the Montana Power Company. E. H. Gray, Elmer Fisher, William Elford, and Frank Mattson received Certificates of Assistance at the same ceremony for their parts in the successful resuscitation. A full account of the presentation was carried in the (Butte) *Montana' Standard,* October 31, 1948.

### ROBERT H. ALMOND

*Georgia Power Company*
Harlem, Georgia

Inside an enclosed 44-kv substation at Harlem, Ga., on the morning of March 18, 1948, Electrician James S. Carson and Apprentice Mechanic Robert H. Almond of the substation maintenance crew were preparing to paint the station's equipment. Carson was endeavoring to tighten a loose terminal lug bolt on the low side oil circuit breaker with his back against a switching frame 20 in. away after Almond had closed bypass switches so he could work safely. The bolt broke at its head, allowing the lead to come loose from the terminal bushing and swing towards Carson. An arc was set up which shocked and burned Carson with 2920 volts from one phase of the low side of the 44-kv to 4600-v, 3-phase, delta-connected transformer bank.

Carson slumped forward unconscious and fell from the stepladder on which he was standing. Almond jumped to his aid and, grabbing him by his clothing, partly dragged and partly carried him 15 ft away from underneath the arcing wires. Almond then began to apply artificial respiration by the prone-pressure method. Carson responded after 3 to 5 minutes, during which time Line Foreman F. F. Baker, and Linemen W. W. Alley and F. R. Harrison, who had been working nearby, removed him between strokes, as Almond continued to administer

ROBERT H. ALMOND (third from right), accepts the Edison Medal presented by T. A. Gibson, Vice President and Augusta Division Manager, Georgia Power Co., in the presence of J. S. Carson (right) whose life was saved. Reading from the left, F. F. BAKER, W. W. ALLEY and F. R. HARRISON also received Certificates of Assistance.

artificial respiration, to a safer location away from the 44-kv switches arcing overhead and overheated transformers spewing oil nearby. Baker then went to summon a doctor and ambulance as Alley opened switches and de-energized the station. When the doctor arrived Carson was breathing freely and was removed to a hospital in Augusta, Ga., where he was treated for 2nd and 3rd degree burns of face and back. Carson returned to work 12 days later, having suffered no permanent disability.

The Edison Medal and Certificate were presented to Robert H. Almond by T. A. Gibson, vice president and Augusta division manager of the Georgia Power Co., at a division operating meeting held at Thomson, Ga., on October 22, 1948. F. F. Baker, F. R. Harrison and W. W. Alley received Certificates of Assistance at the same meeting. The company magazine, *Snap Shots,* reported the meeting in its November, 1948, issue.

C. B. McManus (left), President of The Georgia Power Co., presents the Edison Medal to CORNELIUS CARSON (third from left) for the successful resuscitation of Lineman W. F. Alewine, Jr. (second from left), and Certificates of Assistance to J. P. WARD, E. R. JOHNSON, M. C. KELLEY and B. WEBSTER (reading left to right).

## CORNELIUS CARSON

*The Georgia Power Company*
Atlanta, Georgia

Distribution Line Foreman Grady Webster was assigned the job of replacing phase and neutral wires on a 3-phase, 4-kv Wye distribution circuit in Atlanta, Ga., March 25, 1948. On the crew working with him were: Linemen W. F. Alewine, Jr., C. Carson, J. P. Ward; Truck Driver E. R. Johnson, and Helper M. C. Kelley. In midafternoon Alewine was working on a transformer pole, and Carson and Ward on the two adjacent poles, while Webster and Kelley replaced a broken pole ground on the transformer pole. Alewine had just removed the bottom secondary service taps, the neutral taps and pole ground from the old neutral. Disconnection of the pole ground tap from the old neutral opened the transformer primary circuit and permitted the primary voltage to back up through the transformer and energize the transformer case, pole and pole ground wire. Safetied-off above the secondary rack, Alewine, as he shifted his position, made contact with both the energized transformer case and a ground.

Foreman Webster heard an unusual noise above him and looked up to see Alewine in trouble. He called to Alewine to fall back on his safety strap to clear himself from the circuit. Ward was ordered to go up and clear the transformer, while Carson applied pole-top resuscitation. It took Carson approximately one minute to reach Alewine from the moment of contact. After several minutes of artificial respiration, Alewine started to breathe, but it was 12 minutes more before he could control his own breathing. Ward, meanwhile, had de-energized the transformer, placed the injured man in proper position and pulled his tongue from his throat. Webster, Johnson and Kelley prepared blankets on the ground, placed a ladder and assisted in lowering Alewine with a hand line to the ground. A doctor who had been summoned, dressed 1st, 2nd and 3rd degree burns on right arm and left foot before sending Alewine to an Atlanta hospital from which he returned to work the following morning.

Four hundred Atlanta employees of the Georgia Power Co. were present at the Virginia Avenue Plant when Cornelius Carson received the Edison Medal and Certificate from Company President C. B. McManus on October 13, 1948. B. Webster, J. P. Ward, E. R. Johnson and M. C. Kelley received awards of the Certificates of Assistance at the same ceremony. The company magazine, *Snap Shots,* carried a full account of the presentation in its October, 1948 issue.

ELLIOTT S. DAVIS (right) receives the Edison Medal from E. R. Acker, President, Central Hudson Gas and Electric Corp., and also President of the Edison Electric Institute, on Dec. 6, 1948, at Poughkeepsie, N. Y.

## ELLIOTT S. DAVIS

*Central Hudson Gas & Electric Corporation*
Port Ewen, New York

Elliott S. Davis, commercial representative of the Kingston, N. Y., district, in the course of his regular duties went to a home in Sleightsburgh, Port Ewen, N. Y., on July 6, 1948 to unlock a customer's electric meter box. While he was in the house a severe electric storm broke and a flash inside the meter box indicated to him that lightning had struck close by. Returning to his car for more tools, Davis came upon two prostrate men sprawled at the base of a maple tree 10 ft from a ditch at which he had seen them working previously. Both men were not breathing and were unconscious.

Davis realized the men (W. E. Hamilton and V. R. Smith, Jr.) had been struck by lightning and immediately ran to his car to sound the horn to try to summon aid. He then ran back to the injured men and began artificial respiration by the prone-pressure method upon Hamilton. A woman from a nearby house attracted by the sounding of the horn was instructed by Davis to call the company emergency truck and to get some other aid. Hamilton showed signs of life after 5 minutes of artificial respiration. For 20 minutes Davis continued uninterrupted resuscitation in a continuous downpour accompanied by frequent flashes of lightning, before an ambulance arrived and assisted Davis with the application of an inhalator. Shortly thereafter, Hamilton was able to breathe for himself and was removed in the ambulance to a Kingston hospital from which he was released 3 days later. The other victim, Smith, could not be revived.

A presentation of the Edison Medal and Certificate was made to Elliott S. Davis by President E. R. Acker, Central Hudson Gas & Electric Corp. and also President of the Edison Electric Institute, at Poughkeepsie, N. Y., on December 6, 1948. An account of the award ceremony appeared in the *Kingston Daily Freeman,* Kingston, N. Y., December 10, 1948.

JAMES CINGLIE (left), is presented with the Edison Medal by Jackson Division Manager H. H. Koelbel, Consumers Power Co., at Erie, Mich., in January, 1949.

### WILLIAM M. DENNIS

*Alabama Power Company*
Montgomery, Alabama

Following a rainstorm in Montgomery, Ala., on June 19, 1948, a fallen tree tore down a single-phase secondary circuit carrying 120/240 volts. Lineman W. M. Dennis and Groundmen J. G. Broadway, Jr., and C. Y. Williams were dispatched to make the necessary repairs. Dennis was on a pole and Williams had just pulled the secondary up to him. Standing on the wet ground Broadway picked up one of the secondary conductors and was holding it, waiting to send it up to Dennis, when the secondary circuit suddenly became energized. He shouted out when he felt the shock and, trying to draw back, fell across the other energized line on the ground. He was unconscious and not breathing when Williams reached him.

Williams first made an attempt to pull him off the wire and received an electrical shock in doing so. Dennis, from his position on the pole, threw his rubber gloves down to Williams who promptly used them in cutting the wires to clear the injured man. Dennis had by then reached the ground and he immediately began artificial respiration by the prone-pressure method. In 2 or 3 minutes Broadway was gasping for breath. Five minutes later his breathing became normal. At a hospital in Montgomery he was treated for electrical burns of the right knee and both hands and was discharged the following morning for duty.

Regrettably, one month later, William Maston Dennis himself succumbed to a fatal electric shock. Mrs. W. M. Dennis received her husband's posthumous award of the Edison Medal.

### JAMES CINGLIE

*Consumers Power Company*
Erie, Michigan

While working on a pole between crossarms carrying a 12,500-volt, 3-phase, "Y"-connected, grounded primary circuit and a secondary circuit in the outskirts of Erie, Mich., on June 29, 1948, Lineman George Blessman attempted to tie a rope to the outside conductor of the secondary circuit. As he reached across the top of the secondary, with his right hip contacting the circuit, his head made contact with the center phase of the primary circuit above. Knocked out by the shock, he fell clear 22 ft to the ground with his safety strap around the pole, landing on his back.

When Line Crew Foreman Roy Weaver and Lineman James Cinglie reached him seconds later, Blessman was unconscious and not breathing. While Weaver beat out the fire in the injured man's clothing, Cinglie at once began artificial respiration by the prone-pressure method. Blessman responded after 3 minutes of resuscitation and within 20 minutes was breathing without assistance. When removed to a hospital in Monroe, Mich., the injured man was treated for severe electrical burns of the scalp, right flank and right hand; 2nd and 3rd degree burns of the chest, abdomen and back caused by the burning clothing; and suffered incomplete spastic paralysis of right arm and both legs resulting from cerebral electrical injury.

James Cinglie received the Edison Medal and Certificate in a presentation which was made by Jackson Division Manager H. H. Koelbel, Consumers Power Co., at Erie, Mich., in January, 1949. *Consumers Power News*, the company magazine, carried a picture and account of the presentation in its January, 1949, issue.

### M. O. FLUGSTAD

*Northern States Power Company*
Roseland, Minnesota

Two linemen, W. D. Jenneke and M. O. Flugstad, were transferring an 11,900-v single-phase transmission circuit to a new, higher pole 2 ft away from, and in line with, the old pole, on June 1, 1948, one mile east of Roseland, Minn. Flugstad completed the transfer of the phase wires to a temporary crossarm on the new pole, removed the crossarm on the old pole and left in place a bayonette which had carried the static wire at the top of the pole. When Flugstad climbed to the top of the new pole to complete transfer of the static wire, the other lineman, Jenneke, thinking to save time, began to remove the bayonette which was secured only by a lag bolt. As he loosened the lag screw his attention was momentarily diverted, and the bayonette turned freely on the bolt as an axis, the short end striking a phase wire. Jenneke looked up and instinctively seized the bayonette. He received 6900 volts through his body to ground.

Jenneke fell clear of the electrical circuit and hung in his safety belt, unconscious and not breathing. Flugstad climbed the pole to aid the injured man and applied pole-top resuscitation while lowering him from the pole. Jenneke was conscious and able to breathe unassisted upon reaching the ground.

At a hospital in Montivideo, Minn., he was treated for 3rd degree burns of palm of right hand, 2nd degree burns on back of the same hand and 3rd degree burns on inside of right leg.

M. O. Flugstad received the Edison Medal and Certificate before a large group of fellow employees and company officials attending the presentation at an employee safety meeting in Granite Falls, Minn., on December 20, 1948. R. J. Knobloch, division super-

(*Continued on page* 95)

W. D. Jenneke, whose life was restored by artificial respiration, congratulates his rescuer, M. O. FLUGSTAD (right), Northern States Power Co. lineman, on receiving the Edison Medal at presentation ceremonies in Granite Falls, Minn., Dec. 20, 1948.

# Transmission and Distribution Committee Meeting

## T. J. Brosnan, *Chairman*

THE winter meeting of the Transmission and Distribution Committee was held on Feb. 10 and 11 at the Netherland Plaza Hotel, Cincinnati, Ohio, with 175 members and guests in attendance.

### Standards and Specifications

Activities of the Standards and Specifications Group, sponsored by W. E. Losie, were summarized by subcommittee chairmen.

F. A. Ashbaugh reported that balloting on the revised specification for Douglas Fir crossarms has been completed. However, a number of editorial changes will be made before the specification is released for publication. Work on a similar new specification for Southern Pine crossarms is progressing.

Continued progress in the preparation of proposed EEI-NEMA specifications for suspension insulators was reported by R. M. Havourd. A tentative specification for connectors and splices completed by the Connector and Splice Subcommittee is to be released for trial use to provide a basis for future preparation of formal specifications.

E. K. Karcher announced that TD-7, "Specifications for Spool-Type Secondary Racks," has been published. Balloting on a proposed revision of TD-1, "Specifications for Bolts and Nuts," has been completed but a problem has arisen concerning the detailed specification of steel quality. TD-21, "Specifications for Steel Clevises for Guy Strain Insulators," has been submitted to members for ballot. Work on other proposed specifications for guy hooks, plates and thimbles and 1⅜-in. steel insulator pins is under way.

### Standard Fuse Series

Status of the proposed EEI-NEMA specifications for street lighting equipment was outlined by R. J. Palmer.

W. L. Vest, Jr., reported that tentative time-current characteristics for both fast and slow standard series of fuses have been prepared. These will be sent to members for tentative approval prior to further action in establishing joint EEI-NEMA standards.

D. Burns described the process of coordination employed by The Detroit Edison Co. in the preparation and ultimate use of standard specifications for distribution construction. The importance of coordinating both the form and content of specifications with those who will use them was stressed.

The session on safe design, construction and operation, sponsored by C. E. Bathe, featured discussion of safe design of pole-top arrangements.

F. J. Raps presented a paper by D. C. Stewart emphasizing that transmission and distribution work accounts for about two-thirds of electric shock and burn fatalities in the industry. Nevertheless, some companies are demonstrating that overhead line departments can rank among the safest departments in which to work. One of the most important phases of the job occurs on the drafting board where ultimate working environments are created.

### Safety Features in Pole-Top Design

R. O. Loomis described safety features incorporated in his company's pole-top design. Effort is made to keep the number of wires on poles to a minimum. This is aided by a trend toward small substations with a small number of feeders, careful location of substations, higher distribution voltages, elimination of duplicate neutrals and elimination of separate secondaries for lighting and power.

E. J. Kallevang stated that his company is concentrating on economical methods of increasing working space on pole tops. Care in locating cutouts was urged since the most accessible position may create a hazard for other work on the pole. He also suggested the need for cutout and arrester designs which take up less space.

E. K. Karcher described methods employed to reduce congestion of secondaries and service drops. One type of construction utilizes a cabled secondary consisting of two insulated conductors supported by a bare messenger serving as the neutral. Service drops also are cabled and pulled off the messenger at right angles along the span. Another type utilizes ordinary weatherproof wire for secondaries and services but two crossarms arranged parallel with the line remove service pull-offs from the pole.

### General Engineering

Mobile radio service was the featured subject of the General Engineering Group, sponsored by J. E. McCormack.

W. C. Phillips described the June, 1948, FCC proposal concerning power utility radio service and outlined the arguments presented by EEI and National Committee on Utilities Radio representatives at an FCC hearing in October. The final FCC order has not been issued to date.

R. E. Kolo of the Cincinnati and Suburban Bell Telephone Company described types of mobile radiotelephone service for power utility use offered by telephone companies. Mr. Kolo's presentation is reproduced on page 73 of this issue of the BULLETIN.

F. Budleman of the Link Radio Company outlined recent trends in the development of equipment for mobile radio systems. Mr. Budleman's presentation appears on page 75 of this issue of the BULLETIN.

Details of some extensive company-owned mobile radio systems were described by G. E. Dean. W. R. McMillan described a system utilizing both company-owned and leased facilities.

J. B. Hiers, Jr., estimated that the use of a mobile radio system reduces outage time by 75 per cent and the manhours required for restoration by 25 per cent. C. V. Waddington reported his company's radio system was the only means of communication available to serve division towns during the recent sleet storm affecting a large portion of Kansas. Experience during this storm indicated the need for stronger antennas and larger batteries in mobile units.

### Overhead Group

The Overhead Group, sponsored by L. G. Smith, devoted a major portion of its session to discussion of plans for restoration of service following severe storms. G. E. Dean, J. B. Hiers, Jr., and L. G. Smith described the plans of their respective companies in detail. These include prearranged plans for assembling, evaluating and disseminating detailed storm intelligence, reorganizing company personnel for emergency conditions, augmenting forces from out-

side sources and providing for their housing and feeding, providing emergency stores of line material, supplementing normal transportation facilities, providing adequate telephone facilities for handling customer calls and providing adequate radio facilities for conducting restoration operations.

J. F. Hennessy reported that a study of troubles on 4-kv lines indicated that many conductor failures were due to inadequate clearance from cutouts, arresters, steel crossarm braces, grounded guys, through bolts and unnecessarily long equipment leads.

Problems associated with the construction of a high-voltage transmission line in urban territory were described by G. L. Rhodes.

H. E. Stites outlined the results of the AIEE-EEI Joint Subcommittee survey of shunt capacitor performance. Eighty-three companies covered in the survey reported 2,849,000 kvar of installed capacitors which represents about 10 per cent of the combined demand of their systems. About 78 per cent of the capacitors reported were in the 2300 to 4800 volt class. Exactly 1.2 per cent of all capacitor units failed and 60 per cent of failures were from internal causes. About half of the companies have experienced trouble from telephone interference, and 60 per cent of the companies maintain periodic inspections.

C. J. Beller reported that 27 companies represented on the Committee have thus far indicated that they will report on representative urban, suburban and rural circuits in connection with the AIEE-EEI Joint Subcommittee study of coordination and protection of distribution circuits.

#### Underground Group

The Underground Group, sponsored by J. A. Pulsford, featured panel discussions on cable accessories and on network system operation.

The panel session on cable accessories, conducted by E. F. Nuezel, was devoted primarily to discussion of terminations. C. W. Sward of the G & W Electric Specialty Co. described a new technique in the manufacture of soldered porcelain potheads which can be applied to any make of porcelain. Discussion revealed considerable difficulty in obtaining void-free filling of potheads in the field. M. W. Ghen stressed the importance of using only thoroughly trained men for this job and attributed the successful operation of field assembled potheads on his company's system to the use of one crew for all high-voltage pothead assembly.

The panel session on network operation conducted by J. A. Pulsford covered practices in use of limiters, cutting of faulted secondaries which do not burn clear, coordination with fire departments in handling manhole fires, experience with non-metallic sheathed cable, and the use of central indicating systems. Trouble with alloy fuses blowing at less than rated load was reported.

E. F. Nuezel reported completion of revision of the scope and form of the annual report on Cable Operation. Beginning with the 1948 report only paper-insulated cable will be included. Reporting forms and tables in the report have been reduced in size and number to speed reporting and compilation and provide a more readable report. A revised "Recommended Procedure for the Diagnosis of Cable, Joint and Termination Failures," (EEI Publication Q-7) also has been completed and published.

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# Electrical Equipment Committee Meeting

## B. Van Ness, Jr., *Chairman*

OVER 70 members and guests attended sessions of the 47th meeting of the Electrical Equipment Committee on Feb. 14 and 15 at the Hotel Jefferson, St. Louis, Mo. The program was planned so as to provide ample opportunity for general discussion of diverse subjects.

The closed session, attendance at which is limited to members and utility company guests, comprised nearly the entire first day. The continued interest in the apparatus and system trouble reports and resulting discussions necessitated the allocation of one-half day to this part of the program. Several failures of new equipment, including a 100,000-kw generator, were described and the causes discussed. Careless workmanship or manufacturing procedures rather than defective design were indicated as being responsible for the majority of troubles now encountered with new equipment.

Outstanding features of new equipment being purchased by various companies were described. Considerable discussion of the relative merits of the various types and designs of equipment to perform various functions ensued.

#### Union Electric Co. System

"The Union Electric Company System" was described by E. L. Hough. The system pattern described has been in existence since 1932 and only slight modifications in the major system have been required during the period when the load grew from 400,000 kw to nearly 1,000,000 kw. To economically supply the increased load expected in the future, significant changes in the major system will be required. The major interconnections, even for relatively short distances, of new generating capacity in the metropolitan area will be primarily at 138 kv rather than 69 kv as used previously. In addition, some existing 69-kv circuits will be rebuilt for 138-kv service. Railroad right-of-way will be utilized for the 138-kv circuits in the metropolitan area. The generating capacity to be added within the next four years will increase the system capacity by over 50 per cent.

#### Bulk Power Supply System

"A Bulk Power Supply System for a Metropolitan Area," was described by A. G. Dewars of the Northern States Power Co. Consideration of the rapid increase in load over the past few years, and that expected in the future, indicated that a radical departure from practices that had become well established on the system was necessary. Bulk power transfer within the metropolitan area has been handled primarily by a large number of 13.8-kv circuits. These circuits also are used to serve loads in the metropolitan area and are at present becoming fully loaded. To provide for additional load, if the same system plan were to be used, these circuits would need to be expanded. Many of them are cable circuits which have been in service over 30 years and would need replacing. In addition, 13.8-kv circuit breakers would be required which would necessitate modernization of existing substations and the acquisition of sites for new ones. It was clear that such a project would require major expenditures and a careful analysis of alternate methods

of supplying the load was justified. Such a study was made and as a result, 115-kv circuits were decided upon to handle the bulk power transfer to load centers. In addition to lower costs, the 115-kv circuits would relieve some 13.8-kv circuits for use to supply loads and also make unnecessary the replacement of certain old, small capacity 13.8-kv cable circuits. The overhead 115-kv lines will be built through the center of Minneapolis primarily on railroad right-of-way.

"The Measurement of Daylight," was the subject of a paper by Ward F. Davidson. Changes in daylight illumination are the most important single factor to influence electric lighting load. By studying the variations in actual loads from normals and the corresponding departures of illumination from an assumed average, the appropriate correlations can be made so that actual loads can be adjusted to eliminate this factor. Therefore, it is of interest to utilities to have a reliable method of measuring daylight. The United States Weather Bureau over a period of years has developed an instrument that seems to meet all the requirements for utility application. The instrument is weatherproof and is compensated for effects of ambient temperature. Its output is suitable for operation of a recorder at distances up to 2000 ft from the light-sensitive cell. The Instrument Corporation is undertaking the production of the light sensitive instrument and the Brown Instrument Co. will make the recorders.

#### Power Exchange Practice

Lloyd Hunt described the Power Exchange Practices of the Southern California Edison Co. The conversion from 50 to 60 cycles has been completed. Frequency changers had been used, prior to the changeover, in making interconnections with neighboring utilities. With the conversion in the system operating frequency, it was necessary to employ some method of frequency and load control. An extensive system of tie-line control is being installed. For this purpose, power line carrier current will be employed on the longer circuits and communication circuits used for the shorter distances. The capacity of the interconnected pool is about 5,558 mva. The peak load on the Southern California Edison System is 1,300 mva. Synchronous condensers adding up to 800,000 kva and 300,000 kva of static capacitors have been installed.

"Electrical Power Station Fire Protection," was the subject of a paper prepared by N. L. Clarine, Southern California Edison Co. This paper is printed in full in this issue of the BULLETIN. Prepared discussions of this paper by several of the members indicated that cooperation with local fire departments is considered essential if well-rounded fire protection for electrical stations is to be attained. It was pointed out that fire protection during the construction stages of new installations needs special attention since fire hazards are present but the permanent protection facilities are not generally available.

The results of a survey with water-spray fire extinguishing systems for transformers were discussed by E. S. Fitz. Replies from 38 companies were received. The majority of companies reporting favored piped-in systems with automatic controls. A total of 330 water-spray systems was reported with 200 of these having automatic control. Most companies do not consider water spray on live equipment hazardous and there is no general concern over rust accumulation. Only one company reported receiving credit from an insurance company because of the installation of water-spray systems. Interesting discussion of water-spray systems and the advantages and hazards involved in application on live equipment followed. Some concern was voiced by one member respecting the effects of accumulation of water on energized equipment, which is not affected by fire, but is adjacent to a unit on which spray is being used. The type of nozzle and water resistivity were emphasized as being important in considering the hazards involved in spraying live equipment.

R. W. Wilbraham, Chairman of the EEI Electrical Equipment-Prime Movers Joint Subcommittee on Sleeve Versus Ball Bearings for Power Plant Auxiliary Motors, gave a report concerning the formation and activities of this subcommittee. Mr. Wilbraham stated that this project was undertaken as a result of a suggestion from the Prime Movers Committee that the two committees jointly study the problems associated with auxiliary motor bearings. The membership of the subcommittee is now complete and some phases of the work have been initiated.

## Jacob Hekma

JACOB HEKMA, vice president of the Commonwealth & Southern Corporation,, and a director of the Ohio Edison Company and the Consumers Power Company, died at Palm Beach, Fla., on Feb. 17, 1949. He was 69 years old.

Mr. Hekma had been a vice president and director of Commonwealth & Southern since its organization in 1929. In 1910 he joined the Consumers Power Co. and served successively in positions of assistant secretary, secretary and treasurer until he became a vice president and director of the company in 1920. He had also served as a director of the Ohio Edison Company and the Southern Company.

Born in Leens, Groningen, The Netherlands, Mr. Hekma came to this country with his parents in 1884, and settled in Grand Rapids, Mich., where he began his business career with the Michigan Trust Company. In 1905 he resigned as auditor of the Michigan bank in order to join the firm of Hodenpyl, Walbridge & Co. in New York City. With this firm he first established close and lasting associations with the electric utilities field. He became a member of the firm in 1911.

## Mobile Radio Systems Available and Developments in Recent Years

(*Continued from page* 76)

land stations or mobile units as well as with each other. They are now in common use in the utility service and are proving of great benefit in tower and line construction, cable pulling, line patrol and general field operation.

A rather unique method of laying out a line through new territory was described to me just the other day. After a preliminary aerial survey had located hill-top marker points, pack sets were placed at each point and with the man marking the route. All operations were at night so that the operators on the hill-top locations could see the light carried by the man marking the path and could easily direct him over the radio when he got off the exact line.

# PERSONALS

RALPH H. TAPSCOTT, president of Consolidated Edison Company of New York, Inc., since 1937, has been elected to the newly created post of chairman of the board. Mr. Tapscott will continue as chief executive officer of the Company.

He is succeeded as president by HUDSON R. SEARING, executive vice president of the company since 1944. HARLAND C. FORBES, a vice president since 1945, was elected executive vice president.

Mr. Tapscott joined The New York Edison Co., a predecessor of Consolidated Edison, in 1917 as assistant chief electrical engineer. He was made electrical engineer in 1925 and vice president of The New York Edison and United Electric Light and Power Companies in 1932. When these companies were merged into Consolidated Edison in 1936 he retained the post of vice president. In 1937 he was elected president and a trustee. In 1942 he became chief executive officer.

From 1942 to 1946 Mr. Tapscott served as president of the New York Steam Corporation, a subsidiary, and is now a director of that company as well as all other Consolidated Edison System Companies.

Mr. Searing joined The New York Edison Co. in 1909 as a telephone operator. He transferred to The United Electric Light and Power Co. and became a cadet engineer in 1916 and assistant electrical engineer in 1923. In 1932 he was appointed general superintendent of distribution for the Edison and United Companies.

In 1939 Mr. Searing was made engineer of operation for Consolidated Edison and he was elected a vice president in 1940. He has been a trustee of the company since 1944. He is a director of all Consolidated Edison System Companies and chairman of the board of the Consolidated Telegraph and Electrical Subway Co.

Mr. Forbes joined The New York Edison Company in 1924 as assistant to the chief electrical engineer. He became research engineer in 1928 and system engineer in 1932. He was elected an assistant vice president of Consolidated Edison in 1940 and a vice president in 1945. He was made a trustee of the company in 1948.

Mr. Forbes is chairman of the System Financial Advisory Committee and a vice president and director of the New York Steam Corp. He is a director of the Westchester Lighting Co. and the Yonkers Electric Light and Power Co. He has also served on committees of the AIEE, AEIC and the Edison Electric Institute.

MR. TAPSCOTT

MR. SEARING

MR. JENNISON

MR. BELL

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RALPH D. JENNISON, president of the New York State Electric & Gas Corporation, has been elected chairman of the board at a meeting of the board of directors in New York City. In this capacity he continues as chief executive officer of the company.

JOSEPH M. BELL, JR., manager of Public Utilities Securities for the Equitable Life Assurance Society of the United States, New York City, was elected president to fill the vacancy created by the elevation of Mr. Jennison. Mr. Bell also was elected a member of the board of directors and a member of the executive committee.

ARNOLD W. MILLIKEN, vice president and a member of the board of directors, was named general manager of the company.

EDGAR B. PARSONS, secretary-treasurer, was also elected a member of the board of directors.

Mr. Bell has been identified with the Equitable Life Assurance Society of the United States since 1935 and has been in charge of the management of that society's investments in public utility securities.

He was born in Columbia, S. C., and in 1924 was graduated from the University of South Carolina as a civil engineer.

Immediately following his graduation, he became associated with the W. S. Barstow Company, public utility engineers and managers, and from 1924 to 1928, Mr. Bell was engaged in engineering work for many utility companies, including the New York State Electric & Gas Corp.

From 1928 to 1935, he was associated with investment bankers and financial institutions in New York City, specializing in utility engineering and financing. Prior to joining the Equitable Life Assurance Society in 1935, he was with the Public Utility Loan Department of the Chase National Bank.

Mr. Jennison, who became president of the New York State Electric & Gas Corporation in 1941, has devoted his

life's work to the public utility field, a career that spans 40 years.

Mr. Jennison entered the public utility business in 1909, spending several years in the west and middle west in the construction and operation of public utilities before he joined the W. S. Barstow Company. As vice president and general manager of Barstow Management Association, he supervised the engineering, construction and operation of numerous utilities, including the New York State Electric & Gas Corporation.

Subsequently, he joined the J. G. White Management Corporation, New York City, as vice president. Upon becoming president of the White Company in 1937, he served either as a director or officer of many of the operating companies in the system, among them the New York State Electric & Gas Corporation of which he was a director.

Mr. Jennison has been active in utility association work, having been a director of the Pennsylvania Electric Association, the Empire Gas & Electric Association, and the Edison Electric Institute. He also served as a director of the Council of Electric Operating Companies, formed during World War II to assist in giving the government complete cooperation from public utilities.

Mr. Milliken started his utility career in 1922 as a results engineer in the power plant of the New Bedford (Mass.) Gas & Edison Light Co. In 1924 he became assistant to the manager of the electric department and in 1930 he was made manager of the department. Later he became assistant general manager of that company and remained in that capacity until February, 1939, when he was made vice president and Eastern Division manager of New York State Electric & Gas Corporation, with headquarters in Brewster. In May, 1945, he was appointed superintendent of operations on a statewide basis with headquarters in Binghamton. He became a member of the board in May, 1947.

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WAYNE N. JOHNSON, engineer in charge of the Southern California Edison Co.'s recent frequency change program, has been named vice president in charge of operation of that utility. R. E. FIFE, comptroller, was also elected a vice president.

Mr. Johnson, who supervised the changeover of Edison territory from 50 to 60 cycle operation, joined the company in 1937 as manager of the Vernon City District, having just completed six years as chief electrical engineer of the department of light and power of the city of Vernon. He was appointed superintendent of distribution in 1941 and four years later assistant manager of operation.

Mr. Johnson, following his election as vice president, was succeeded by E. B. KRUGER as administrator of the frequency change department.

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JAMES W. PARKER, President and general manager of The Detroit Edison Co., has been appointed special consultant to General Lucius D. Clay, United States Military Governor for Germany, to examine the critical power shortage in Western Germany.

Mr. Parker departed on a two-month survey on March 9, accompanied by his assistants, ALOIS HOEFLE, assistant superintendent of operations, Toledo Edison Co., and George P. Steinmetz, chief engineer, Public Service Commission of Wisconsin.

Mr. Parker has been with Detroit Edison since 1910, except for a year's duty with the War Department in 1918. He was chief engineer for 20 years, was elected vice president in 1935 and a member of the board of directors in 1940. During World War II he served as consultant on engineering and technical problems for the War Production Board and the War Manpower Commission and also served as Chairman of the Industrial Advisory Group to the Atomic Energy Commission. Mr. Parker was born in Auburn, N. Y., in 1886 and was graduated from Cornell University in 1908.

Mr. Hoefle began his career as junior engineer with the Public Service Commission of Colorado in 1923. In 1924 he served as junior engineer with the Public Service Commission of Portsmouth, Ohio; from 1925 to 1934, with the Toledo Edison Co.; from 1934 to 1939 with the Toledo and Indiana Railroad Co.; and from 1939 to 1941 as assistant to the vice president of the Toledo Edison Co.

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# EEI Resuscitation Medals Presented For Courageous and Humane Actions

(*Continued from page* 90)

intendent, Northern States Power Co., presented the award. The *Montivideo American,* Minn., reported the ceremonies on December 24, 1948.

HAROLD G. COLE
*Florida Power Corporation*
St. Petersburg, Florida

On the corner pole of a transmission line, a 3-phase, 2300-v grounded delta circuit was being changed over to 11-kv service in St. Petersburg on July 6, 1948. Linemen Harold Cole and William Brower had moved the neutral down and covered it with line hose, leaving an uncovered mechanical jumper between the two dead ends. They then climbed above it to dead-end the top and bottom phase wires. "Hot" jumpers covered with hose hung down from the two

HAROLD G. COLE (left), receives the Edison Medal from J. S. Gracy, Vice President of the Florida Power Corp.

phase wires after the top phase wires and one side of the bottom phase had been dead-ended. While threading the other side of the bottom phase wire through the thimble of the dead-end insulator, Brower touched his chest to a loop of the 2300-v line while his left leg was in contact with the uncovered neutral jumper. There was a flashing arc and Brower fell back on his safety belt, his hooks in the pole.

Cole, with one hand on the energized phase wire and the other on the dead-end insulator, immediately snatched the wire away and broke the contact. Brower slumped over the phase wire jumpers which Cole also cut close to the blocks to de-energize the circuit. Cole pulled the injured man upright in his hooks and began application of pole-top resuscitation. Brower revived after several strokes. Fearing further contact with the hot wires Cole cut through Brower's safety belt but could not hold him. Brower fell about 18 ft to the ground where he continued to breathe regularly although still unconscious. Within ten minutes he had regained consciousness and was taken to a hospital in St. Petersburg where he was treated for 3rd degree burns on the chest and left shin above the ankle.

At Florida Power Corporation's annual safety dinner meeting, Harold G. Cole was presented with the Edison Medal and Certificate by J. S. Gracy, vice president of the company. The *St. Petersburg Times* reported the ceremonies in its issue of January 13, 1949.

### J. L. BOLIN

*Tampa Electric Company*
Dade City, Florida

Lightning struck the pole on which A. H. Green was replacing a fuse in a primary cutout on June 30, 1948, between 8 and 8:30 p. m. in Dade City, Fla. Relating the incident later, Green said: "The last thing I remember was a large ball of flame. The next thing I remember was, when I came to, I was hanging down on the pole in my body belt. . . . I reached up and got hold of the wire above me. Took my right foot, struck it in the pole and put my other hook in the pole and worked back up to finish my work." Still conscious, Green went on to check all other outages that had been reported to him before returning to his office, where he began to complain of weakness and dizziness and was driven to his home. It was now approximately 10:00 p. m. Green lost consciousness and stopped breathing. Repeated telephone calls had brought Lineman J. L. Bolin and Dr. W. E. Stanfield to the scene. Bolin immediately began artificial respiration by the prone-pressure method as Dr. Stanfield gave intravenous injections of coramine. Ten minutes of artificial respiration restored intermittent breathing and 20 minutes later the injured man could breathe normally. An inhalator was used in the latter part of the resuscitation. Green ceased breathing several times thereafter, even when removed to a hospital, and Bolin each time resumed artificial respiration. It was not until approximately 5:30 a.m. (July 1) that Green regained consciousness. H. D. Doyle, patrolman, also assisted in applying artificial respiration to the injured man.

J. L. Bolin left the employment of the Tampa Electric Co. in October, 1948, and the Edison Medal was given into the custody of Mrs. Bolin who joined her husband at his new place of employment in the Panama Canal Zone, January, 1949.

## CONVENTIONS AND MEETINGS

### APRIL, 1949

4-6 AGA-EEI Motor Vehicle Conference, Netherland Plaza Hotel, Cincinnati, Ohio.
5-7 Fifteenth Annual Sales Conference, EEI, Edgewater Beach Hotel, Chicago, Ill.
6-8 Missouri Valley Electric Association, Engineering Conference, President Hotel, Kansas City, Mo.
11-14 National Conference of Electric and Gas Utility Accountants, Book-Cadillac Hotel, Detroit, Mich.
11-14 National Association of Corrosion Engineers, Netherland Plaza Hotel, Cincinnati, Ohio
13-15 Southeastern Exchange, Annual Convention, Boca Raton Hotel, Boca Raton, Fla.
18-20 Midwest Power Conference, Sherman Hotel, Chicago, Ill.
19-21 American Institute of Electrical Engineers, South West District Meeting, Baker Hotel, Dallas, Texas.
20-23 American Society of Civil Engineers, Oklahoma City, Okla.
21-22 Rocky Mountain Electrical League, Spring Conference, Plains Hotel, Cheyenne, Wyo.
21-22 Rate Research Committee, EEI, Hotel Cleveland, Cleveland, Ohio.
22 Maryland Utilities Association, Annual Meeting, Lord Baltimore Hotel, Baltimore, Md.
25-26 Pennsylvania Electric Association, Accounting Conference, Pittsburgh, Pa.

### MAY

1-6 National Electrical Wholesalers Association, Netherland Plaza Hotel, Cincinnati, Ohio.
2-3 Indiana Electric Association, Annual Young Men's Utility Conference, Ipalco Hall, Indianapolis, Ind.
2-3 Chemistry Subcommittee, Prime Movers Committee, EEI, Philadelphia, Pa.
2-3 Transmission and Distribution Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
2-3 Electrical Equipment Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
2-4 American Society of Mechanical Engineers, Spring Meeting, Hotel Mohican, New London, Conn.
2-5 Chamber of Commerce of the U. S. A., Washington, D.C.
3-4 Accident Prevention Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
4-6 Meter and Service Committee, EEI, Hotel Somerset, Boston, Mass.
5-6 Pennsylvania Electric Association, Prime Movers Committee, William Penn Hotel, Pittsburgh, Pa.
9-11 Purchasing and Stores Committee, EEI, Jefferson Hotel, St. Louis, Mo.
9-12 Westinghouse Agent-Distributors Association, French Lick Hotel, French Lick Springs, Ind.
12-13 Pennsylvania Electric Association, Transmission and Distribution Committee, Irem Temple Country Club, Dallas, Pa.
16-19 National Fire Protection Association, Fairmont Hotel, San Francisco, Calif.
20 New Jersey Utilities Association, Seaview Country Club, Absecon, N. J.
25-27 Pacific Coast Electrical Association, Inc., Hotel del Coronado, Coronado, Calif.

### JUNE

May 31-June 2 ANNUAL MEETING, EDISON ELECTRIC INSTITUTE, Atlantic City, N. J.
20-21 Public Utilities Advertising Association, Netherland Plaza Hotel, Cincinnati, Ohio
20-24 American Institute of Electrical Engineers, Summer General Meeting, New Ocean House, Swampscott, Mass.
22-25 Hydraulic Power Committee, EEI, Shirley Savoy Hotel, Denver, Colo.
23-26 Michigan Electric Light Association, Annual Convention, Grand Hotel, Mackinac Island, Mich.
27-28 Prime Movers Committee, EEI, San Francisco, Calif.
27-July 1 American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.
28-30 Canadian Electrical Association, Banff Springs Hotel, Banff, Canada

### JULY

12-14 American Society of Civil Engineers, Mexico City, Mexico.

### SEPTEMBER

11-14 Rocky Mountain Electrical League, Fall Convention, Stanley Hotel, Estes Park, Colo.
16-17 The Maryland Utilities Association, Fall Conference, Cavalier Hotel, Virginia Beach, Va.
16-17 Public Utilities Association of the Virginias, Greenbrier Hotel, White Sulphur Springs, W. Va.

### OCTOBER

3-5 Electrical Equipment Committee, EEI, Schenectady, N. Y.
17-18 Transmission and Distribution Committee, Lord Baltimore Hotel, Baltimore, Md.
25-27 Pacific Coast Electrical Association, Inc., Fall Conference, Hotel Californian, Fresno, Calif.

March, 19

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*(Terms Expiring 1949)*

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H. T. PRITCHARD.....Indianapolis Power & Light Co., Indianapolis, Ind.
K. M. ROBINSON.....The Washington Water Power Co., Spokane, Wash.
R. L. THOMAS.....Consolidated Gas Electric Light & Power Co., Baltimore, Md.
WILLIAM WEBSTER.....New England Electric System, Boston, Mass.

*(Terms Expiring 1950)*

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REX I. BROWN.....Mississippi Power & Light Co., Jackson, Miss.
HANCE H. CLELAND.....San Diego Gas & Electric Co., San Diego, Calif.
E. W. DOEBLER.....Long Island Lighting Co., Mineola, N. Y.
J. A. LONGLEY.....Central Illinois Light Co., Peoria, Ill.
L. A. MAGRAW.....Central Illinois Public Service Co., Springfield, Ill.
H. B. MUNSELL.....Kansas City Power & Light Co., Kansas City, Mo.
R. S. NELSON.....Gulf States Utilities Co., Beaumont, Texas
C. E. OAKES.....Pennsylvania Power & Light Co., Allentown, Pa.
B. F. PICKARD.....Interstate Power Co., Dubuque, Iowa
MCGREGOR SMITH.....Florida Power & Light Co., Miami, Fla.
A. C. SPURR.....Monongahela Power Co., Fairmont, W. Va.
O. TITUS.....Metropolitan Edison Co., Reading, Pa.

*(Terms Expiring 1951)*

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J. M. BARRY.....Alabama Power Co., Birmingham. Ala.
GEORGE M. GADSBY.....Utah Power and Light Co., Salt Lake City, Utah
D. E. KARN.....Consumers Power Co., Jackson, Mich.
J. E. LOISEAU.....Public Service Company of Colorado, Denver, Colo.
PAUL B. MCKEE.....Pacific Power and Light Co., Portland, Ore.
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S. C. MCMEEKIN.....South Carolina Electric & Gas Co., Columbia, S. C.
GROVER C. NEFF.....Wisconsin Power and Light Co., Madison, Wis.
P. H. POWERS.....West Penn Power Co., Pittsburgh, Pa.
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IRWIN L. MOORE.....New England Electric System, Boston, Mass.

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